R.J.
SEDITA

UNCLASSIFIED

NAVSHIPS 93053

0967-063-2020

Formerly 0280-446-4200

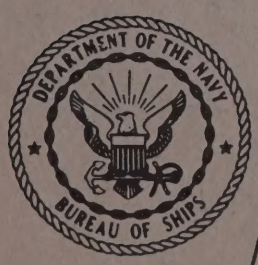
TECHNICAL MANUAL

FOR

RADIO RECEIVER R—390A/URR

VOLUME II OF III

Basic Reproduced W/T-1 dtd Aug 1963
W/T-1(A) dtd Nov 1964
W/T-4 dtd Nov 1966



BUREAU OF SHIPS · NAVY DEPARTMENT · WASHINGTON 25, D.C.

UNCLASSIFIED

TEMPORARY CHANGE T-4 to TECHNICAL MANUAL for Radio Receiver R-390A/URR NAVSHIPS 0967-063-2010 (formerly NAVSHIPS 93053).

This temporary change revised the manual to reflect the equipment changes made by Field Changes 4-R-390A/URR and 5-R-390A/URR which appeared in EIBs 655, 661 and 664.

When this change is included in the manual, the manual shall cover the equipment as though Field Changes 4-R-390A/URR and 5-R-390A/URR, NAVSHIPS 0967-063-2140 had been accomplished on the equipment. This change does not supersede any other changes or corrections.

Maintenance Support Activities shall make this change in the technical manual immediately but shall keep the superseded data intact for support of equipments that have not been modified.

Holders of equipment accompanied by technical manuals shall not make this change in the manual until accomplishment of the field changes referenced above.

Insert this temporary change in the manual immediately after the front cover and preceding the title page or prior changes or temporary corrections in effect. Make pen-and-ink changes in the manual as follows:

1. The following technical manual change material was originally published as part of Field Change 4-R-390A/URR which appeared in EIB 655, 661 and 664.

Figure 89, sheet 2: Delete wire between P120-11 and shielded ground 1/4 inch above P120-11. Change shielded ground connection into a test jack and at right, label "J904-Diode Load Test Jack."

Add the following notes on page 2:

NOTE 1: The AN/USM-116 Multimeter is to be used throughout this technical manual in lieu of the TS-505 Multimeter.

NOTE 2: The Impedance Adaptor MX-1487/URM-25D is to be used between RF Signal Generator and Receiver whenever alinement or adjustment of the RF or IF sections of the receiver are made.

2. The following technical manual change material was originally published as part of Field Change 5-R-390A/URR which appeared in EIBs 655, 661 and 664.

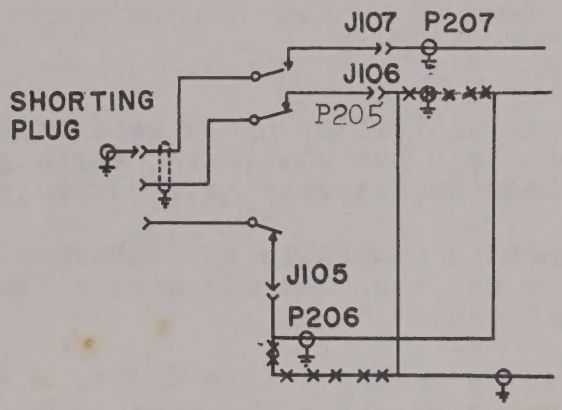


Figure 1. Correction to figure 89-1.

a. Volume 1, page 5 and Volume 2, page 11; add at bottom of page "Antenna input connections modified by Field Change 5, Shipboard installations use J103."

b. Volume 3, pages 7, 8, 169, and 171; add at left side of figure "Antenna input connections modified by Field Change 5, Shipboard installations use J103 (see figure 89-1."

c. In the following paragraphs, change "Balanced Antenna" to "Unbalanced Antenna": 48C, 107a thru 113a, 115b(1), 116a, 118a thru 121a, and 122F.

d. Page 91, step 11; delete "Balanced" from Test Connection column.

e. Add the following at the top left of figures 57 and 75 through 81: "Use J103 Antenna Jack in lieu of J104 for test on shipboard installations – Field Change 5."

f. Page 178, figure 89-1:

(1) Correct antenna input connections at upper left side of page as shown in figure 1 of this article.

(2) Delete "125 ohm Balanced" in J104 block at left of antenna input.

(3) Below antenna input wiring, write "Antenna input modified on shipboard installations by Field Change 5. Shipboard installations use J103."

30 November 1964
0967 063 2031
Formerly 0280 446 4301

TEMPORARY CORRECTION T-1(A) TO TECHNICAL MANUAL FOR RADIO RECEIVER R-390A/URR NAVSHIPS 93053

This temporary correction revises the manual to reflect the equipment changes made by Field Change 3-R-390A/URR. The purpose of this field change is to alter the electrical access at the rear of the receiver from terminal boards to "AN" type connectors. If it becomes necessary to remove the receiver from its cabinet, it will be necessary only to unfasten connectors instead of the individual wires at the terminal boards. The field change applies to all shipboard R-390A/URR Receivers, all serial numbers.

Maintenance Support Activities shall make this correction in the technical manuals immediately but shall keep the superseded data intact for support of equipments that have not been modified.

Holders of equipment accompanied by technical manuals shall not make this correction in the manuals until accomplishment of the field change.

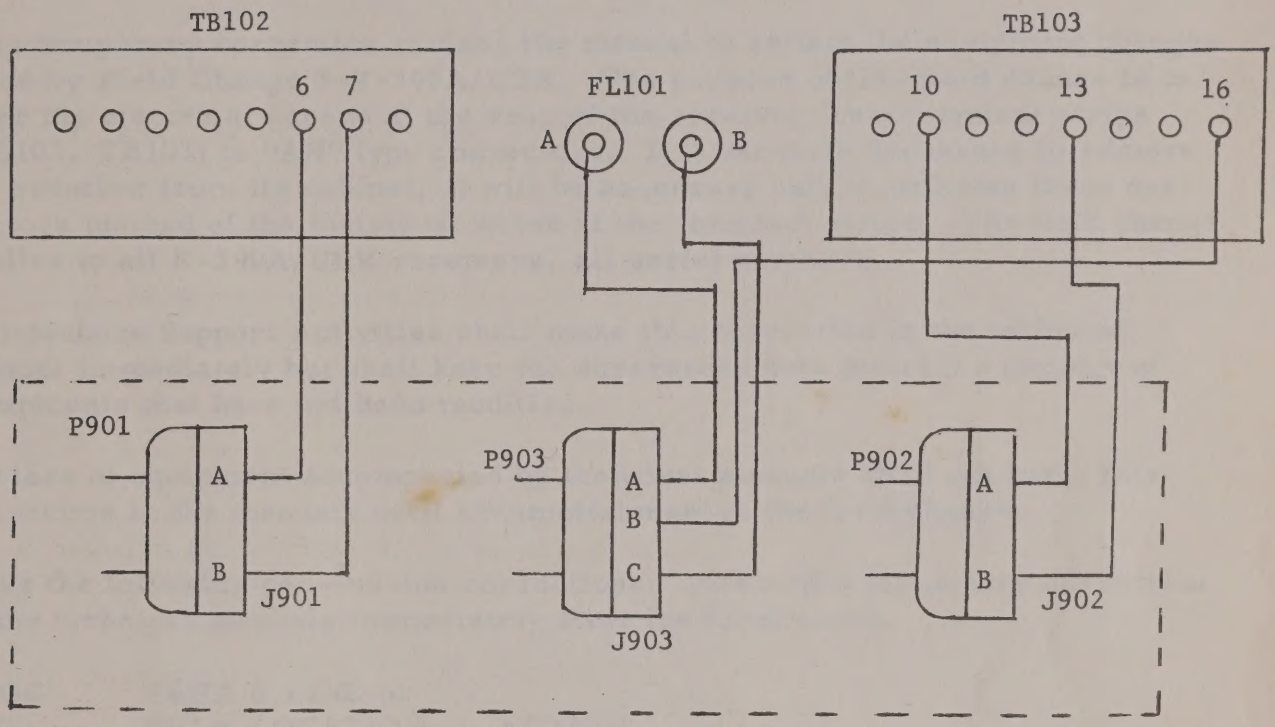
Make the following pen-and-ink corrections. Insert this temporary correction in the technical manuals immediately after the front cover.

PAGE NO.	PARA & LINE or FIG & LOCATION	ACTION
Volume I		
11	Figure 7	Add: "This panel is now modified. See Figure 1 of T-1(A) to NAVSHIPS 93053."
Volume II		
9	Figure 5	Delete those parts of the illustration associated with: (a) "600 ohm speaker" (b) "To 115/230 volts AC 48 to 62 CPS" (c) "Balanced 600 ohm audio line to auxiliary equipment" Add: "The cables are now terminated with "AN" plugs which are connected to the receptacles shown in Figure 1 of T-1(A) NAVSHIPS 93053."
12,14, 15	Figure 7	Delete illustrations 8 to 19 inclusive.
13	WARNING	Delete second sentence. Add at end of paragraph: "To prevent shock hazard to personnel, be sure terminal 16 on rear panel is grounded to ships hull thru J903-P903 pin B."

PAGE NO	PARA & LINE or FIG & LOCATION	ACTION
21	15 (e) Step 2	Delete: "Loudspeaker connected to LOCAL AUDIO terminals 6 and 7, or ...."
	Step 3	Add after 13: "....via P902 and J902."
		Delete: "If 600 ohm line is not available, connect headset to terminals for test purposes."
Volume III		
126	Figure 75	Delete "16 GND" and add: "Ground common lead of electronic multimeter at any convenient point on the receiver."
130	Figure 76	Add: "Connections to terminal boards TB102 and TB103 must be made from inside the receiver."
134	Figure 77	Same as Figure 76.
140	Figure 79	Same as Figure 76.
142	Figure 80	Same as Figure 76.
178	Figure 89 (Sheet 1)	Change Fig. 89, sheet 1, to show AC input power in accordance with Figure 1 center drawing of T-1(A) NAVSHIPS 93053.
179	Figure 89	Change Fig. 89, sheet 2, to show audio output in accordance with Fig. 1 of T-1(A) NAVSHIPS 93053.

SUPPLEMENTAL SCHEMATIC DIAGRAM

FIGURE 89(2)--- NAVSHIPS 93053



J901 is MS3102A10SL-4P
J902 same as J901
J903 is MS3102A16S-5P

P901 is MS3108B-10SL-4S or MS3106B-10SL-4S
P902 same as P901
P903 is MS3108B-16S-5S or MS3106-B-16S-5S

P901-P902 have Cable Clamp MS3057-4
P903 has Cable Clamp MS3057-8

Figure 1

T-1 to NAVSHIPS 93053 7 August 1963

TEMPORARY CORRECTION T-1 TO TECHNICAL MANUAL FOR RADIO RECEIVER R-390A/URR NAVSHIPS 93053

This temporary correction revises the manual to reflect the equipment changes made by Field Change 3-R-390A/URR. The purpose of this field change is to alter the electrical access at the rear of the receiver from terminal strips (TB102, TB103) to "AN" type connectors. If it becomes necessary to remove the receiver from its cabinet, it will be necessary only to unfasten three connectors instead of the individual wires at the terminal strips. The field change applies to all R-390A/URR receivers, all serial numbers.

Maintenance Support Activities shall make this correction in the technical manual immediately but shall keep the superseded data intact for support of equipments that have not been modified.

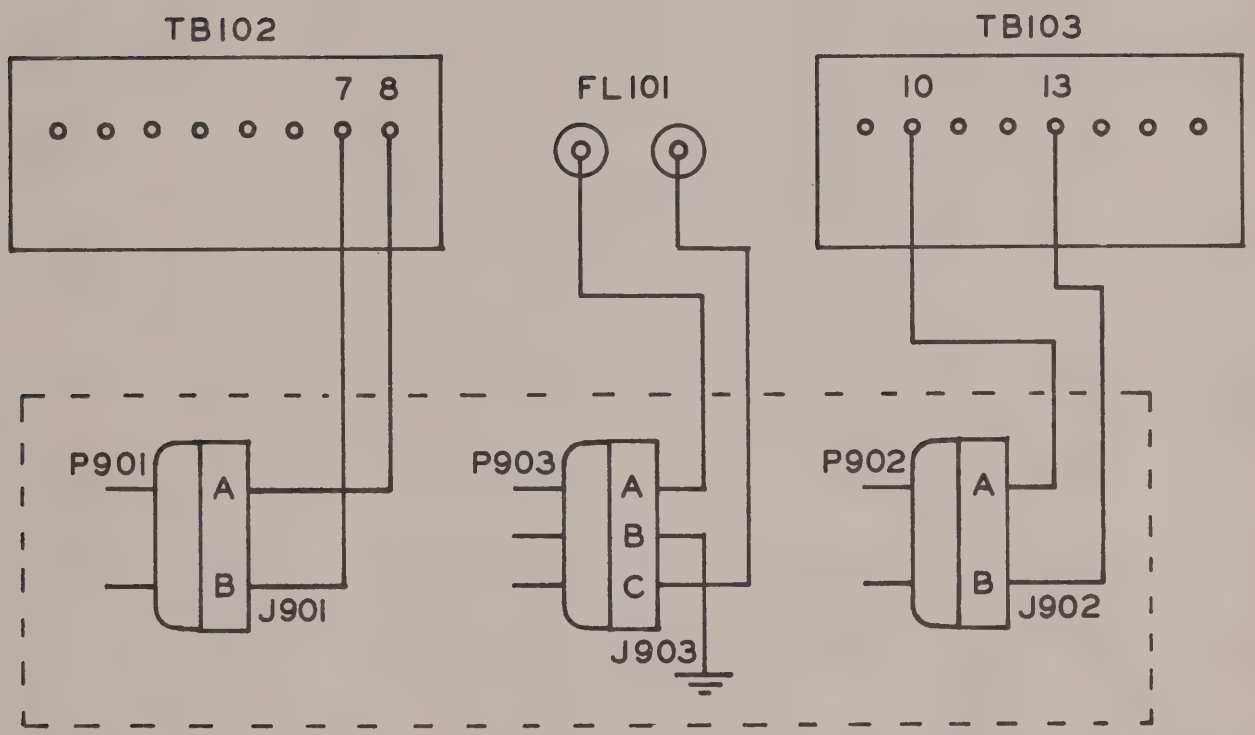
Holders of equipment accompanied by technical manuals shall not make this correction in the manuals until accomplishment of the field change.

Make the following pen-and-ink corrections. Insert this temporary correction in the technical manuals immediately after the front cover.

PAGE NO	PARA & LINE or FIG & LOCATION	ACTION
Volume I		
11	Figure 7	Add: "This panel is now modified. See Figure 1 of this correction."
Volume II		
9	Figure 5	Delete those parts of the illustration associated with: (a) "600 ohm speaker" (b) "To 115/230 volts AC 48 to 62 CPS" (c) "Balanced 600 ohm audio line to auxiliary equipment" The cables are now terminated with "AN" plugs which are connected to the receptacles shown in Figure 1 of this temporary correction.

PAGE NO	PARA & LINE or FIG & LOCATION	ACTION
12, 14, 15	Figure 7	Delete illustrations 8 to 19 inclusive
13	WARNING	Change: "...connect GND terminal 16 on the rear panel to the same ground as the power source." to: "...be sure that the receiver is grounded to the same source as the AC power."
21	15 (e) Step 2	Delete: "Loudspeaker connected to LOCAL AUDIO terminals 6 and 7, or..."
	Step 3	Add after 13: "via P902 and J902."
		Delete: "If 600 ohm line is not available, connect headset to terminals for test purposes."
Volume III		
126	Figure 75	Delete "16 GND" and add: "Ground common lead at any convenient point on the receiver."
130	Figure 76	Add: "Connections to terminal strips TB102 and TB103 must be made from inside the receiver."
134	Figure 77	Same as Figure 76.
140	Figure 79	Same as Figure 76.
142	Figure 80	Same as Figure 76.
179	Figure 89 (Sheet 2)	Add: "For wiring of connector channel on back panel of receiver, see Figure 1 of this correction.
		It is recommended that Figure 1 be inserted between Figure 89(1) and Figure 89(2).

SUPPLEMENTAL SCHEMATIC DIAGRAM
FIGURE 89 ② —— NAVSHIPS 93053



J901 IS MS3102A10SL-4P
J902 SAME AS J901
J903 IS MS3102A16S-5P

P901 IS MS3108B-10SL-4S
P902 SAME AS P901
P903 IS MS3108B-16S-5S

P901-P902 HAVE CABLE CLAMP MS3057-4
P903 HAS CABLE CLAMP MS3057-8

FIGURE 1.

TECHNICAL MANUAL
No. 11-5820-358-20
TECHNICAL ORDER
No. 31R1-2URR-442

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

WASHINGTON 25, D. C., *10 February 1961*

RADIO RECEIVER R-390/URR

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CHAPTER	4	SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE		

***This manual supersedes so much of TM 11-856A, 20 January 1956, including C1, 19 March 1956; C2, 17 May 1956; C3, 23 November 1956; C4, 7 June 1957; C5, 23 July 1958, and C6, 13 November 1958, as pertains to organizational maintenance of subject equipment.**

Section	I.	Shipment and limited storage		
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CHAPTER 1

INTRODUCTION

1. Scope

This manual covers the installation and second echelon maintenance of Radio Receiver R–390A/URR. The operating instructions for this equipment are contained in TM 11–5820–358–10.

2. Forms and Records

Forward comments concerning this manual to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS–PA2d, Fort Monmouth, N. J.

Note. For applicable forms and records, see paragraph 2, TM 11–5820–358–10.

CHAPTER 2

INSTALLATION

3. Unpacking

a. Packaging Data. When packed for shipment, the components of the receiver are placed in a water-vaporproof container and packed in a wooden box. An exploded view of the wooden box and its contents is shown in figure 1. The dimensions of the box are approximately 24¼ inches high, 20½ inches wide, and 14¾ inches deep. The packed box weighs approximately 100 pounds, with a volume of 3.9 cubic feet.

b. Removing Contents. Select a location where the equipment may be unpacked without exposure to the weather, and which is convenient to the place of installation.

CAUTION: Be careful when uncrating, unpacking, and handling the equipment, because it is easily damaged.

(1) Place the packing case conveniently near the installation location.

(2) Cut and fold back the metal straps.

(3) Remove the nails with a nailpuller.

(4) Remove the top and one side of the wooden box.

(5) Remove the desiccant bags, the cardboard tray, and the plywood board.

(6) Take out the outer cardboard carton that contains the receiver.

(7) Open the carton and withdraw the inner carton that is enclosed in the moisture-vaporproof barrier.

(8) Slit open the seams of the moisture-vaporproof barrier and open the inner cardboard carton.

(9) Remove any spacers or padding from the inner cardboard carton.

(10) Withdraw the receiver from the inner carton and place it on a workbench near its final location.

(11) Remove the technical manuals and the running spares.

4. Checking Unpacked Equipment

a. Check the contents of the cartons against the master packing slip.

b. Check the receiver front panel for damage to the knobs, the glass meter windows, and the frequency-indicator dial.

c. Operate the control knobs; examine them for looseness.

d. Turn the MEGACYCLE CHANGE and the KILOCYCLE CHANGE controls throughout their range. Rough operation or binding indicates a damaged tuning system.

e. Remove the top and bottom dust covers by removing the 16 screws (TM 11–5820–358–10) and lockwashers that secure the covers to the main frame.

f. Inspect the subchassis on the upper and lower decks of the receiver for loose connectors, loose tube shields, and broken tubes as follows:

(1) See that all connectors are seated firmly.

(2) If the receiver is to be used in a fixed installation, remove the shields from all tubes (fig. 2 and 3) except V201 through V206, V505, and V701.

(3) Unless extremely dusty conditions are expected, do not replace the dust covers.

(4) Do not replace the dust covers if the receiver is to be installed in Cabinet CY–979/URR or Cabinet CY–917/URR.

g. Remove the fuse from the fuseholder on the rear panel (TM 11–5820–358–10) marked AC 3 AMP. Check the position of the OVENS switch on the rear panel. Refer to the chart below for the proper fuse rating.

CAUTION: To avoid serious damage to the

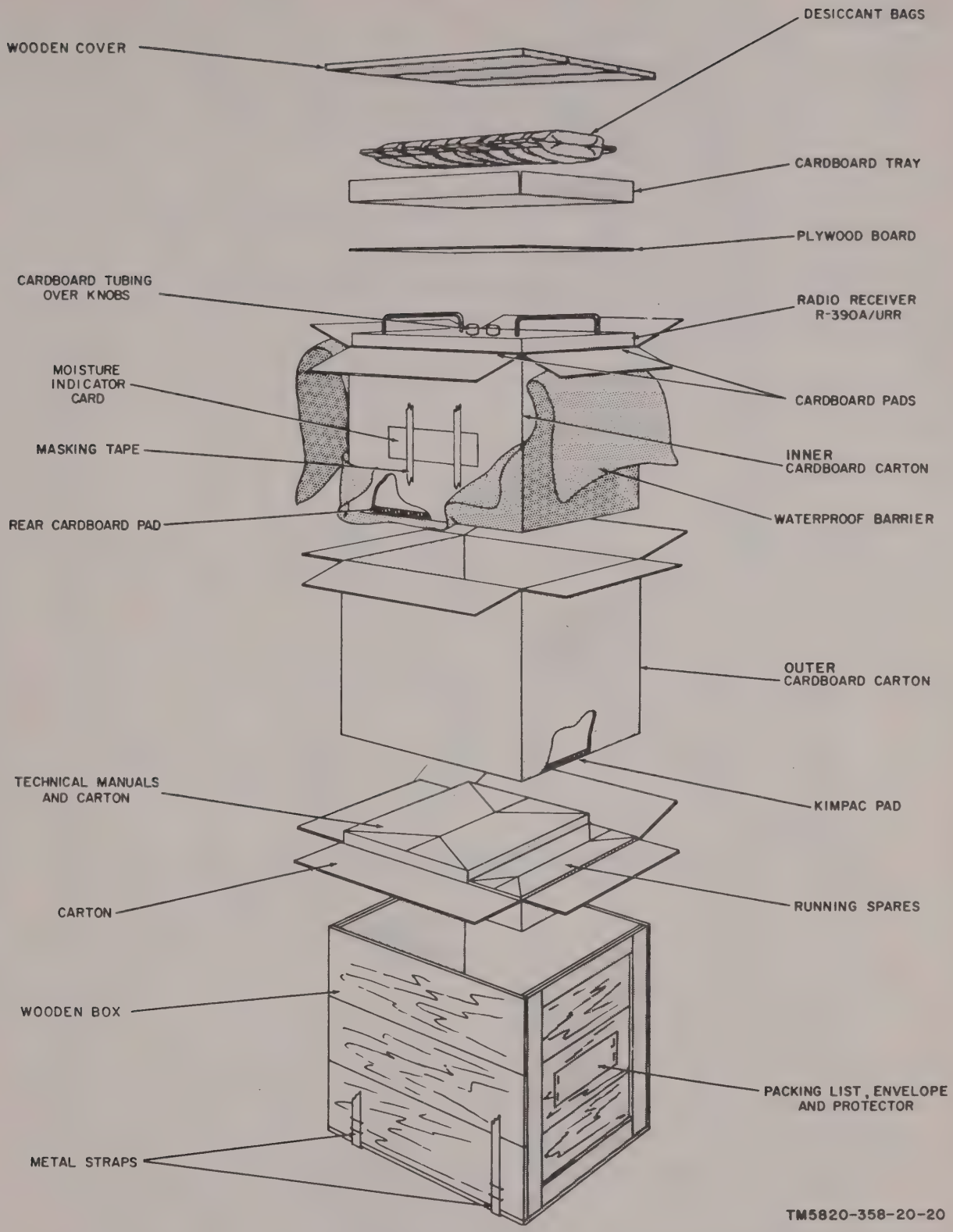


Figure 1. Packaging.

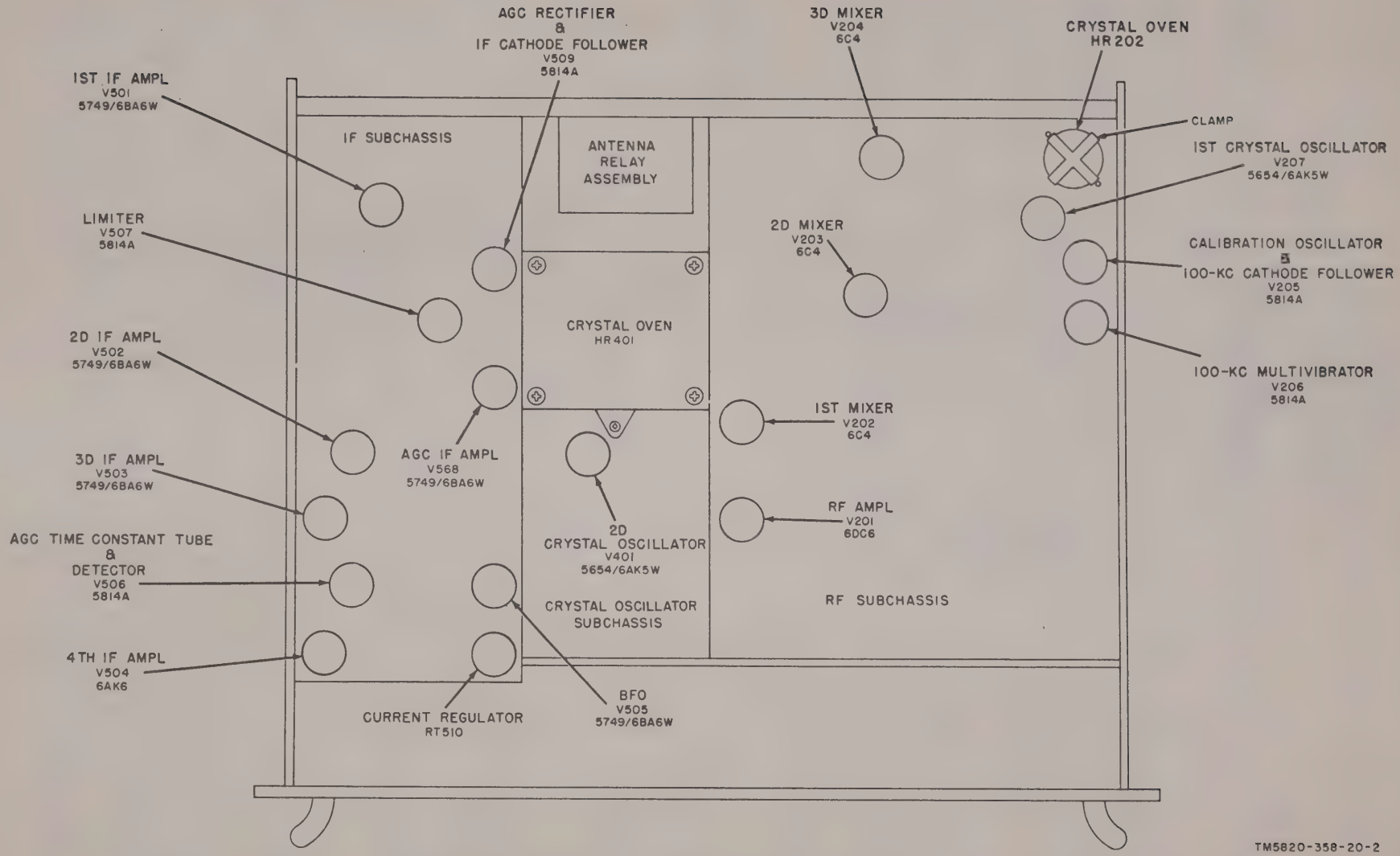

AGC RECTIFIER & IF CATHODE FOLLOWER V509 5814A
3D MIXER V204 6C4
CRYSTAL OVEN HR202
1ST IF AMPL V501 5749/6BA6W
IF SUBCHASSIS
ANTENNA RELAY ASSEMBLY
CLAMP
1ST CRYSTAL OSCILLATOR V207 5654/6AK5W
LIMITER V507 5814A
2D MIXER V203 6C4
CALIBRATION OSCILLATOR & 100-KC CATHODE FOLLOWER V205 5814A
CRYSTAL OVEN HR401
2D IF AMPL V502 5749/6BA6W
100-KC MULTIVIBRATOR V206 5814A
1ST MIXER V202 6C4
AGC IF AMPL V568 5749/6BA6W
3D IF AMPL V503 5749/6BA6W
RF AMPL V201 6DC6
2D CRYSTAL OSCILLATOR V401 5654/6AK5W
AGC TIME CONSTANT TUBE & DETECTOR V506 5814A
CRYSTAL OSCILLATOR SUBCHASSIS
RF SUBCHASSIS
4TH IF AMPL V504 6AK6
BFO V505 5749/6BA6W
CURRENT REGULATOR RT510
TM5820-358-20-2

Figure 2. Radio Receiver R-390A/URR, top deck, tube, and crystal location.

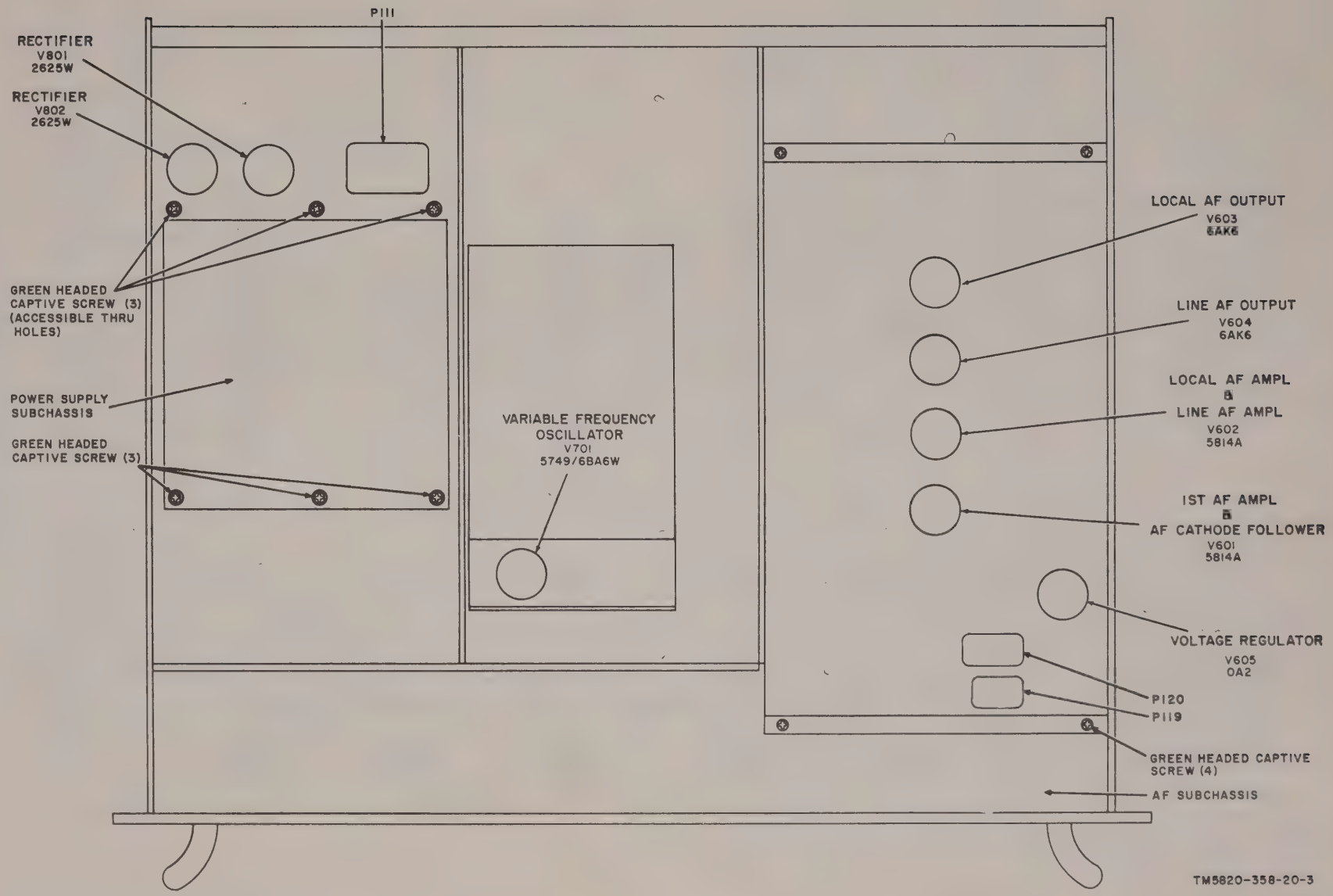


Figure 3. Radio Receiver R-390A/URR, bottom deck. tube, and subchassis location.

receiver, do not use any fuse other than the value specified.

Ac source voltage	OVENS switch position	Fuse rating in amperes
115-volt	ON	3
115-volt	OFF	2
230-volt	ON	1½
230-volt	OFF	1

Note. Receivers bearing order No. 14–Phila–56, serial numbers 2683 and above, and order No. 14385–Phila–58 have a ¼-ampere and a ⅛-ampere B+ fuse on the rear panel for protection against short circuits in the B+ circuits.

h. Inspect for bent or broken connectors and terminals on the rear panel. See that the special tools are in place in their holders, and that the spare fuses are of proper rating and clipped firmly to the rear panel (TM 11–5820–358–10).

i. Check the contents of the running spares box for damaged parts.

5. Shelter Requirements

The shelter housing should be sufficiently weathertight to protect the equipment. The shelter should allow enough room for free air circulation.

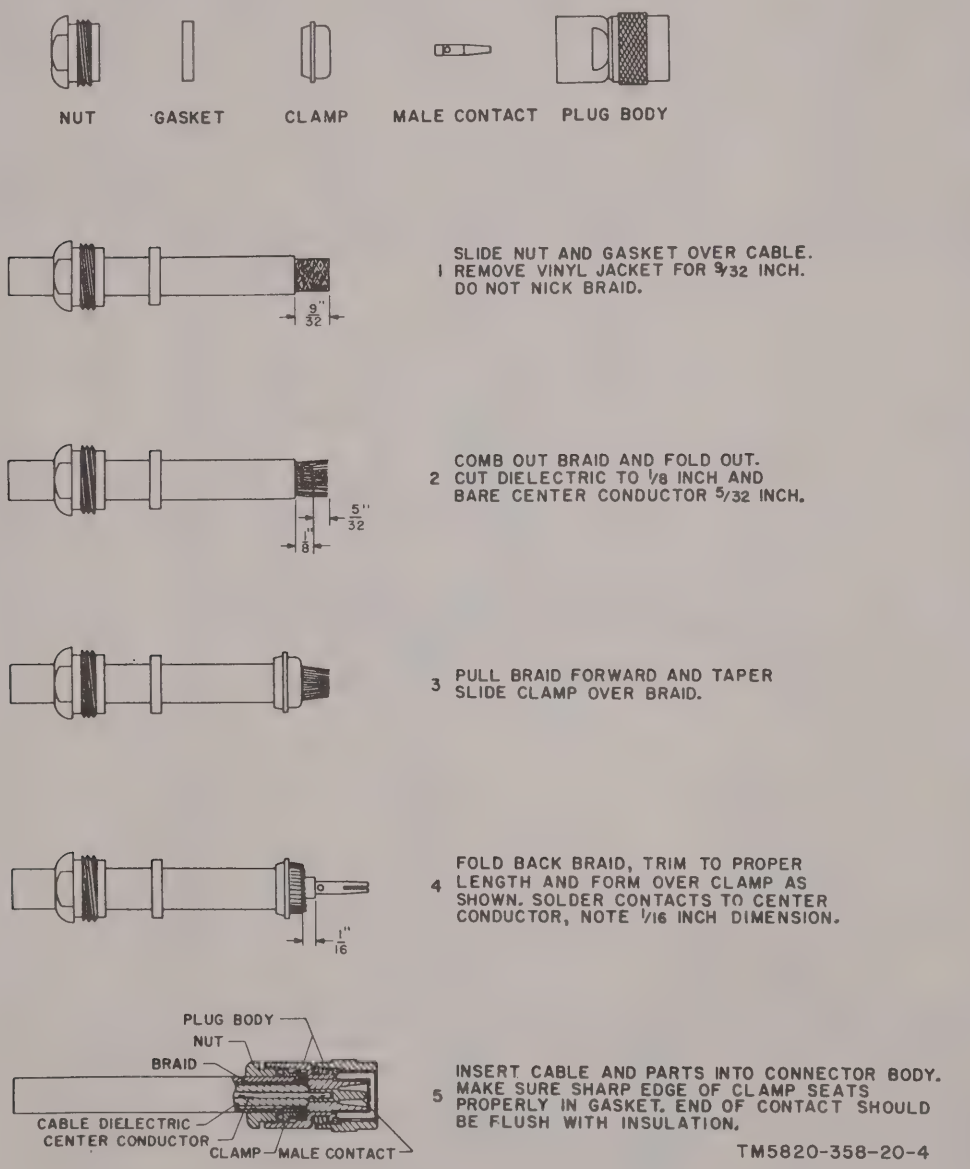

NUT
GASKET
CLAMP
MALE CONTACT
PLUG BODY
9/32"
1 SLIDE NUT AND GASKET OVER CABLE. REMOVE VINYL JACKET FOR 9/32 INCH. DO NOT NICK BRAID.
5/32"
1/8"
2 COMB OUT BRAID AND FOLD OUT. CUT DIELECTRIC TO 1/8 INCH AND BARE CENTER CONDUCTOR 5/32 INCH.
3 PULL BRAID FORWARD AND TAPER SLIDE CLAMP OVER BRAID.
1/16"
4 FOLD BACK BRAID, TRIM TO PROPER LENGTH AND FORM OVER CLAMP AS SHOWN. SOLDER CONTACTS TO CENTER CONDUCTOR, NOTE 1/16 INCH DIMENSION.
PLUG BODY
NUT
BRAID
CABLE DIELECTRIC
CENTER CONDUCTOR
CLAMP
MALE CONTACT
5 INSERT CABLE AND PARTS INTO CONNECTOR BODY. MAKE SURE SHARP EDGE OF CLAMP SEATS PROPERLY IN GASKET. END OF CONTACT SHOULD BE FLUSH WITH INSULATION.
TM5820-358-20-4

Figure 4. Assembly of Connector Plug UG–573/U on coaxial cable.

6. Installing Receiver

a. Antenna. The receiver is frequently used with a rhombic, doublet, or double-doublet antenna.

(1) For information concerning rhombic and doublet antennas, refer to TM 11–666.

(2) For double-doublet information, refer to TM 11–2629.

b. Assembling Connector Plug UG–573/U. Figure 4 gives complete instructions for assembling Connector Plug UG–573/U or Connector Plug PL–259.

c. Receiver. The receiver is shipped with all tubes, crystals, and fuses in place. When the receiver is to be used as part of a system, refer also to the system technical manual for instructions.

(1) *Fixed, tabletop installation.* The receiver is housed in Cabinet CY–917/URR or in a similar well-ventilated case for fixed operation.

(*a*) Place the receiver on any sturdy table or bench.

(*b*) Use the receiver without the top and bottom dust covers and without the tube shields (para 4*e*).

(2) *Fixed, rack installation.* To install the receiver in a standard rack, proceed as follows:

(*a*) Remove the top and bottom dust covers.

(*b*) Remove the tube shields as directed in (*b*) above.

(*c*) Remove one of the blank panels from the rack.

(*d*) Install the angle brackets that come with the rack for receiver support.

(*e*) Slide the receiver into place.

(*f*) Insert the bolts, which were removed from the blank panel, through the elongated holes located along the vertical edges of

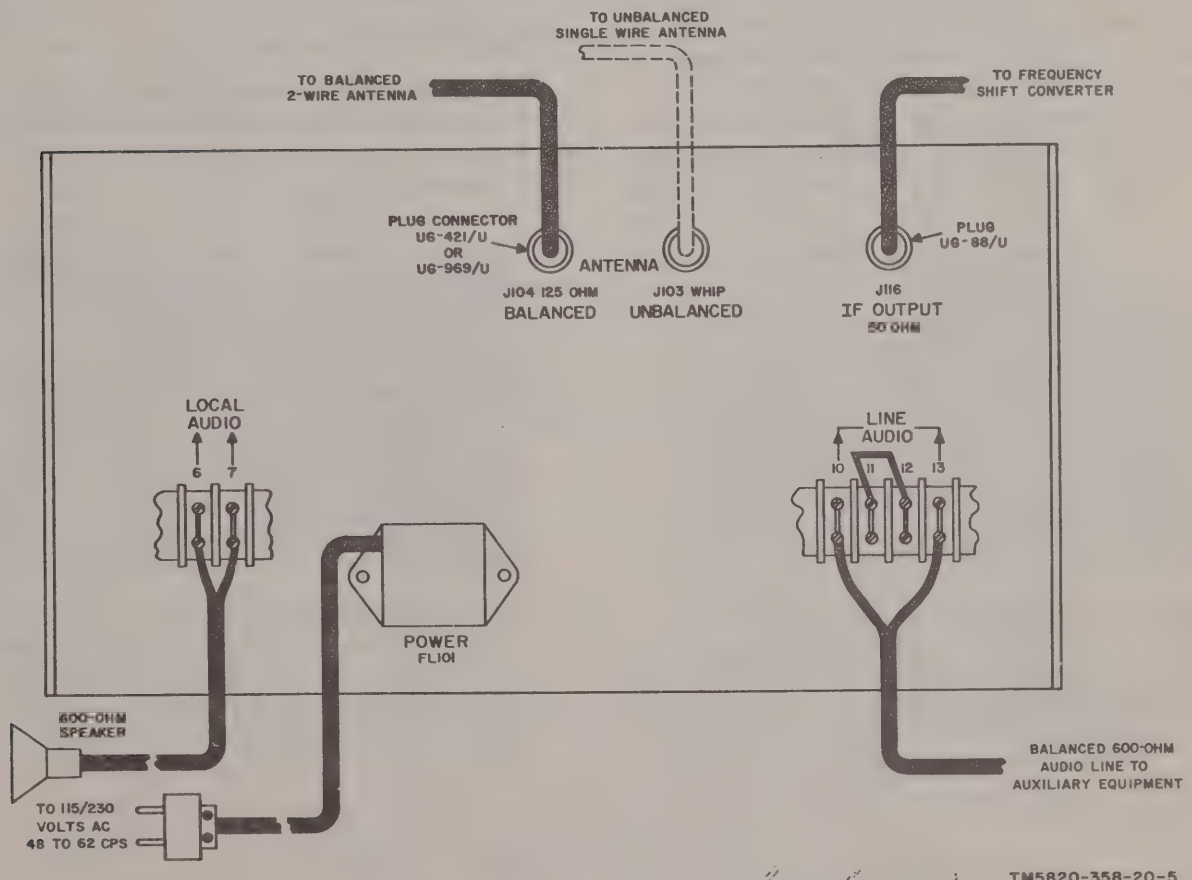


Figure 5. Cording diagram.

the receiver front panel. (TM 11–5820–358–10).

(3) *Mobile, tabletop installation.* To install the receiver for mobile operation when housed in Cabinet CY–979/URR, proceed as follows:

(*a*) Bolt the cabinet securely to a table or shelf that is fastened rigidly to the vehicle.

(*b*) Allow space for ventilation, for access to the connections on the rear panel, and for withdrawal of the receiver from the cabinet for servicing.

(*c*) Remove the top and bottom dust covers (para 4 *e*).

(*d*) Remove the blank panel from the cabinet and install the receiver.

(*e*) Secure the front panel to the cabinet, with the bolts removed from the blank panel.

(4) *Mobile, cabinet, or rack installation.* To install the receiver in Electrical Equipment Cabinet CY–1216/U, securely bolt the receiver cabinet or rack to the body of the vehicle.

(5) *Ventilation.* In all installations, *provide as much ventilation as possible.*

(*a*) Do not use the receiver with the dust covers in place unless extremely dusty or sandy conditions exist.

(*b*) For tabletop cabinets, remove the dust covers before the receiver is installed.

(*c*) In fixed installations, operate the receiver with the specified tube shields removed (para 4*f*).

(*d*) Allow as much space as possible at the back of the cabinet or rack for air circulation.

(*e*) When more than one receiver is housed in a cabinet, always use a 1¾-inch or larger blank strip between the receivers.

(6) *Support.* For mobile installations, provide support for the lower rear of the receiver. This support is provided in the cabinets listed in (3) and (4) above. For other cabinets, use the mounting holes that are provided at the rear of the receiver. Dowel pins may be inserted to hold the receiver securely. The drawing of the rear panel of the receiver (TM 11–5820–358–10) shows the locations and dimensions of the dowel pin gussets (lower corners).

7. Connecting Receiver (fig. 5, 6, and 7)

The receiver will operate from either 115 or 230 volts ac. *The power transformer can be damaged if 230 volts is applied to it when it is connected to operate on 115 volts.* To check to see that the TB801 is connected for the correct alternating current (ac) voltage, connect the receiver to a 115-volt ac line, turn the receiver on, and proceed as follows:

a. If the pilot lamps light at full brilliance, the receiver is connected for 115-volt operation.

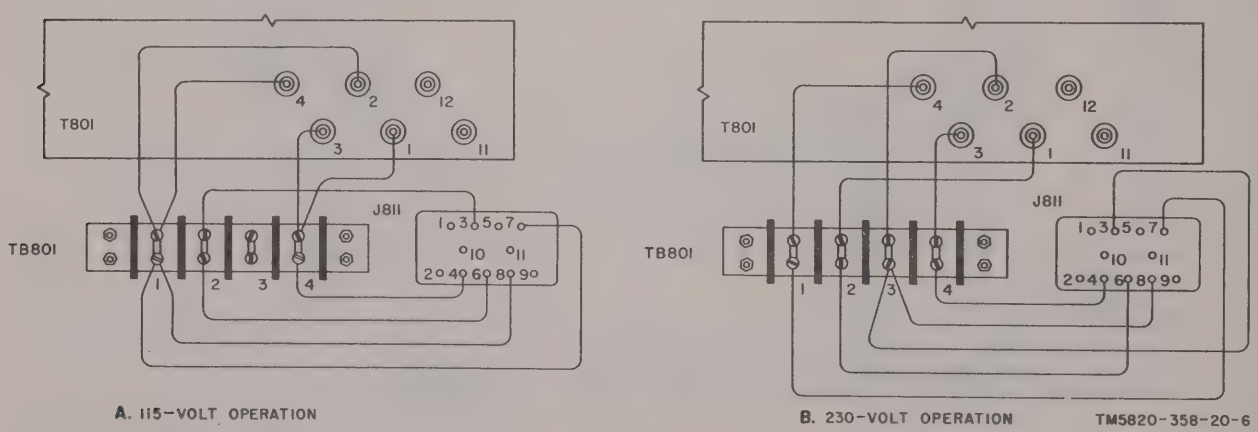
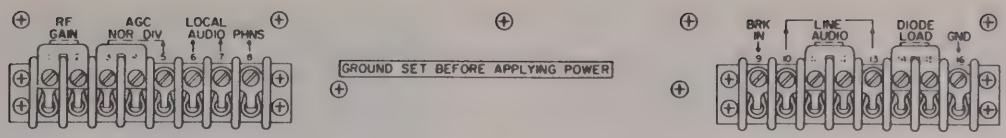
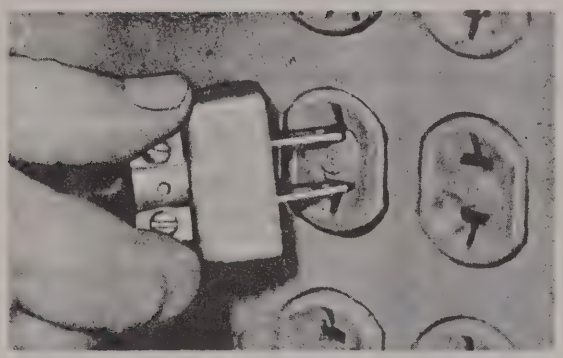


Figure 6. Connections for 115-volt or 230-volt operation.

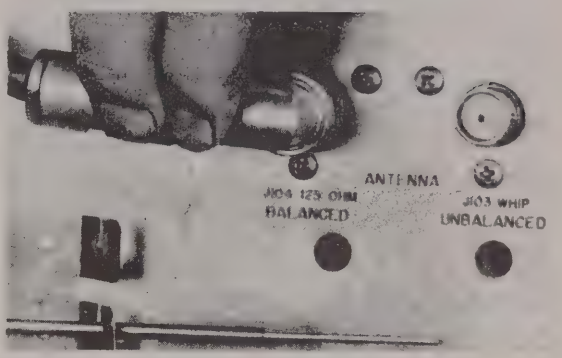


1 Each receiver is shipped with jumpers connected between terminals 1 and 2, 3 and 4, 11 and 12, and 14 and 15. These four jumpers are required for normal operation.



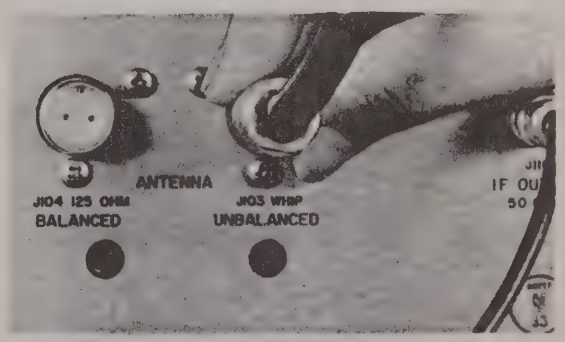
2 Plug the power cord into the ac power source.

Caution: Be sure that the power source is of the proper frequency and voltage.



4 For adapting unbalanced coaxial lead-in to the BALANCED ANTENNA connector, use Adapter Connector UG–971/U with lead-in terminated in Connector Plug 573/U whenever possible; if these are not available, use Adapter Connector UG–970/U with lead-in terminated in Connector Plug PL–259.

3 For connecting 50- to 200-ohm balanced antennas, such as a balanced doublet to the BALANCED ANTENNA connector, use Radio Frequency Cable RG–22 with Connector Plug UG–421/U, or use Radio Frequency Cable RG–86/U with Connector Plug 969/U.



5 For connecting a whip antenna or a random length single-wire antenna to the UNBALANCED ANTENNA connector, use Connector Plug UG–573/U. Make the antenna lead-in (Radio Frequency Cable RG–8/U or RG–11/U) as short as possible.

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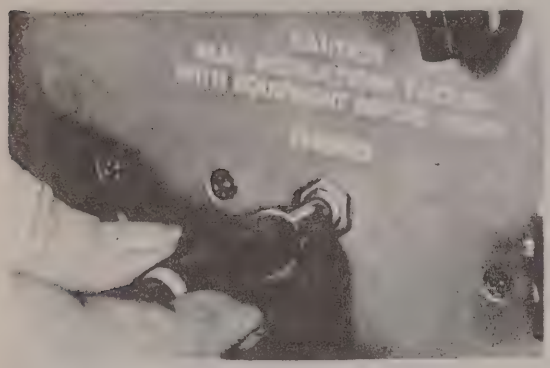
Figure 7①. Connecting procedure (part 1 of 4).

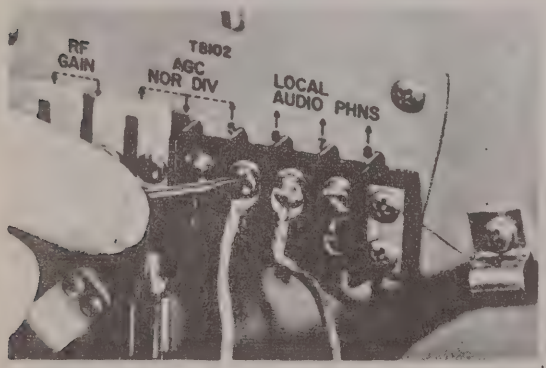
antenna input connection modified by field change 5, shipboard installations see p. 103

6 Perform step 7, 8, or 9 below, depending on the type of listening device used.

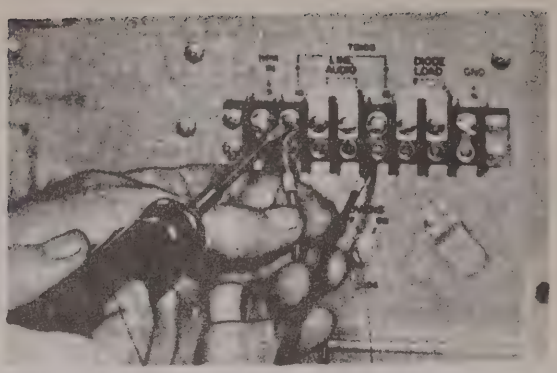


7 Plug the headset into the PHONES jack.

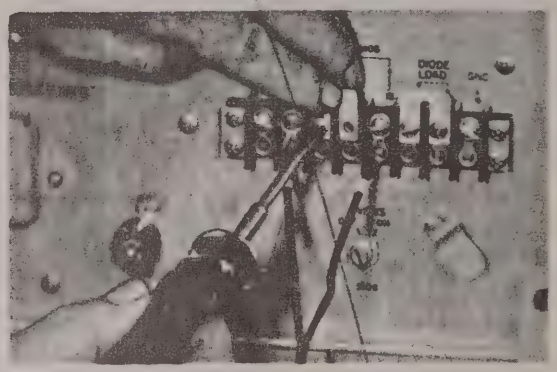
8 Connect the headset terminals to PHNS terminal 8 and terminal 7 (ground).



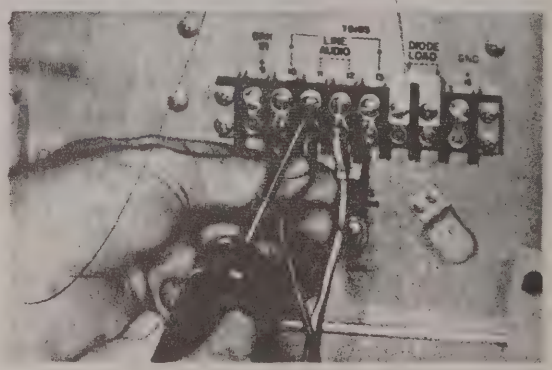
9 Connect the loudspeaker terminals to LOCAL AUDIO terminals 6 and 7.



10 For balanced line operation, connect the balanced line to LINE AUDIO terminals 10 and 13. If a balancing bridge is to be used for long-distance applications, perform steps 11 and 12 below.



11 Remove the jumper from terminals 11 and 12.



12 Connect the balancing bridge between terminals 11 and 12.

TM5820-358-20-7②

Figure 7②. Connecting procedure (part 2 of 4).

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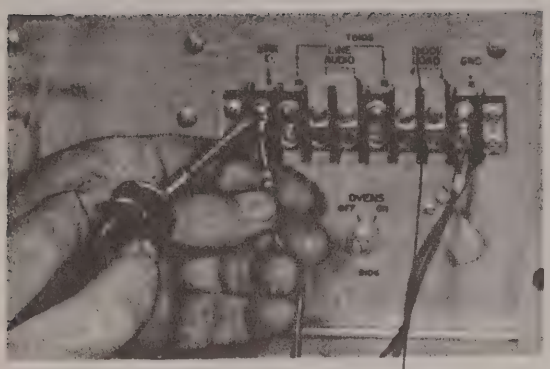
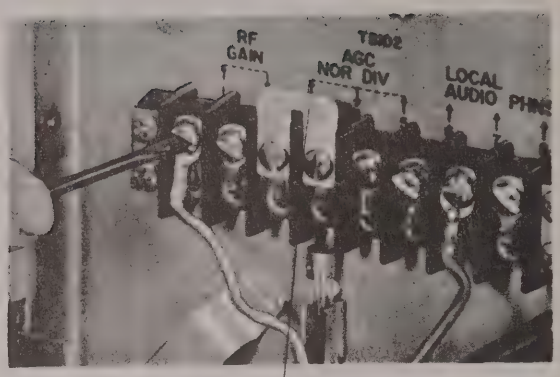
b. If the pilot lamps light at half brilliance, the receiver is connected for 230-volt operation.

c. If the pilot lamps light at full brilliance and the receiver is to be used on 230 volts, disconnect the receiver and remove the power supply subchassis from it (para 18). Connect T801 for 230-volt operation (fig. 6).

WARNING: The voltages used in this receiver are high enough to endanger human life. To prevent shock hazard to personnel touching outside metal parts of the receiver, connect GND terminal 16 on the rear panel to the same ground as that of the power source. Do not depend on the front panel screws or the antenna transmission line to ground the chassis.



13 If a transmitter is being used with the receiver for break-in operation, connect the control lines from the transmitter to BRK IN terminal 9 and GND terminal 16.



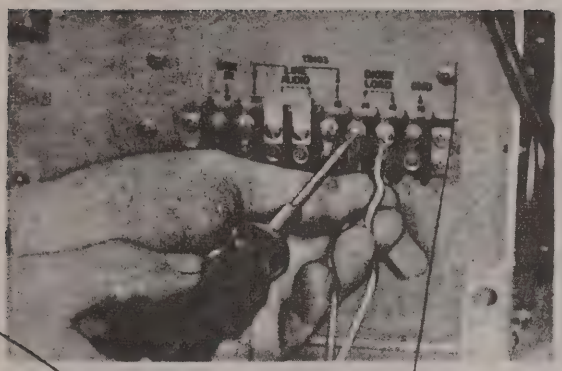
15 Connect an external 5,000-ohm potentiometer to RF GAIN terminal 1 and terminal 7 (ground).

14 For external gain control, remove the jumper from RF GAIN teminals 1 and 2, and perform step 15.

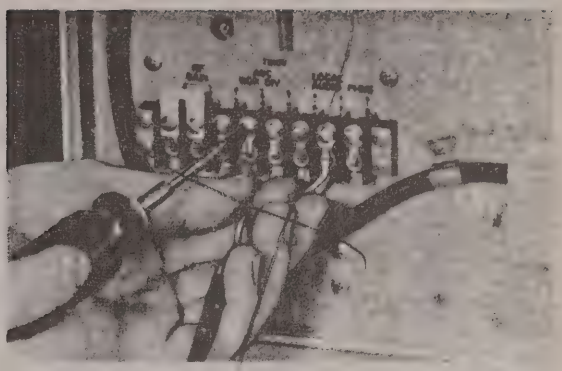
16 To use an external diode load, remove the jumper from DIODE LOAD terminals 14 and 15, and perform step 17.

TM5820-358-20-7③

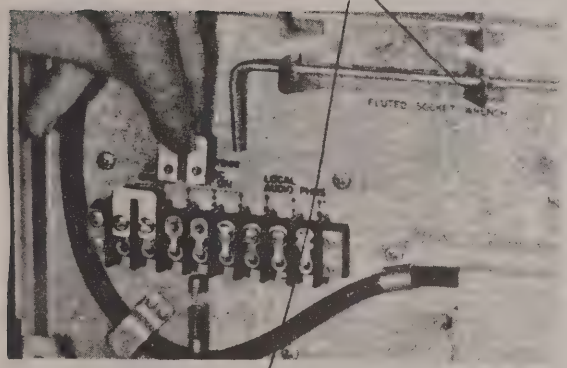
Figure 7③. Connecting procedure (part 3 of 4).



17 Connect the lines from the external diode load to terminals 14 and 15.



19 Connect the negative terminal of the external agc source to terminal 4, and the positive terminal of the agc source to terminal 7 (ground).



18 For external automatic gain control (agc), remove the jumper from AGC NOR terminals 3 and 4, and perform step 19.

20 For frequency-shift converters that require an intermediate frequency (if.) output in a teletypewriter system, connect the coaxial transmission cable terminated in Radio Frequency Plug UG–88 to IF OUTPUT jack.

TM5820-[illegible] ④

Figure 7④. Connecting procedure (part 4 of 4).

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. GENERAL

8. Scope of Second Echelon Maintenance

Second echelon maintenance consists of the following:

a. Replacement of defective fuses (TM 11–5820–358–10).

b. Preventive maintenance (para 11).

c. Lubrication (para 12).

d. Visual inspection (para 13).

e. Overall operational test (para 14).

f. Troubleshooting (sect II).

g. Tube testing (para 17).

h. Replacement of power supply and audio-frequency (af) subchassis (para 18 and 19).

i. Replacement of crystals and incandescent lamps (para 20–23).

9. Tools, Materials, and Test Equipment Required

The materials, tools, and test equipment required for second echelon maintenance are listed below.

a. Tools.

Tool Equipment, TE–41.

b. Materials.

Cheesecloth, bleached, lint-free.

Cleaning Compound (Federal stock No. 7930–395–9542).

c. Test Equipment.

Nomenclature	Common name	Technical manual
Test Sets Electron Tube TV–7/U, TV–7A/U, TV–7B/U, and TV–D/U, or equal	Tube tester	TM 11–6625–274–12
Multimeter AN/URM–105	Multimeter	TM 17–6625–203–12

10. Special Tools Supplied (TM 11–5820–358–10)

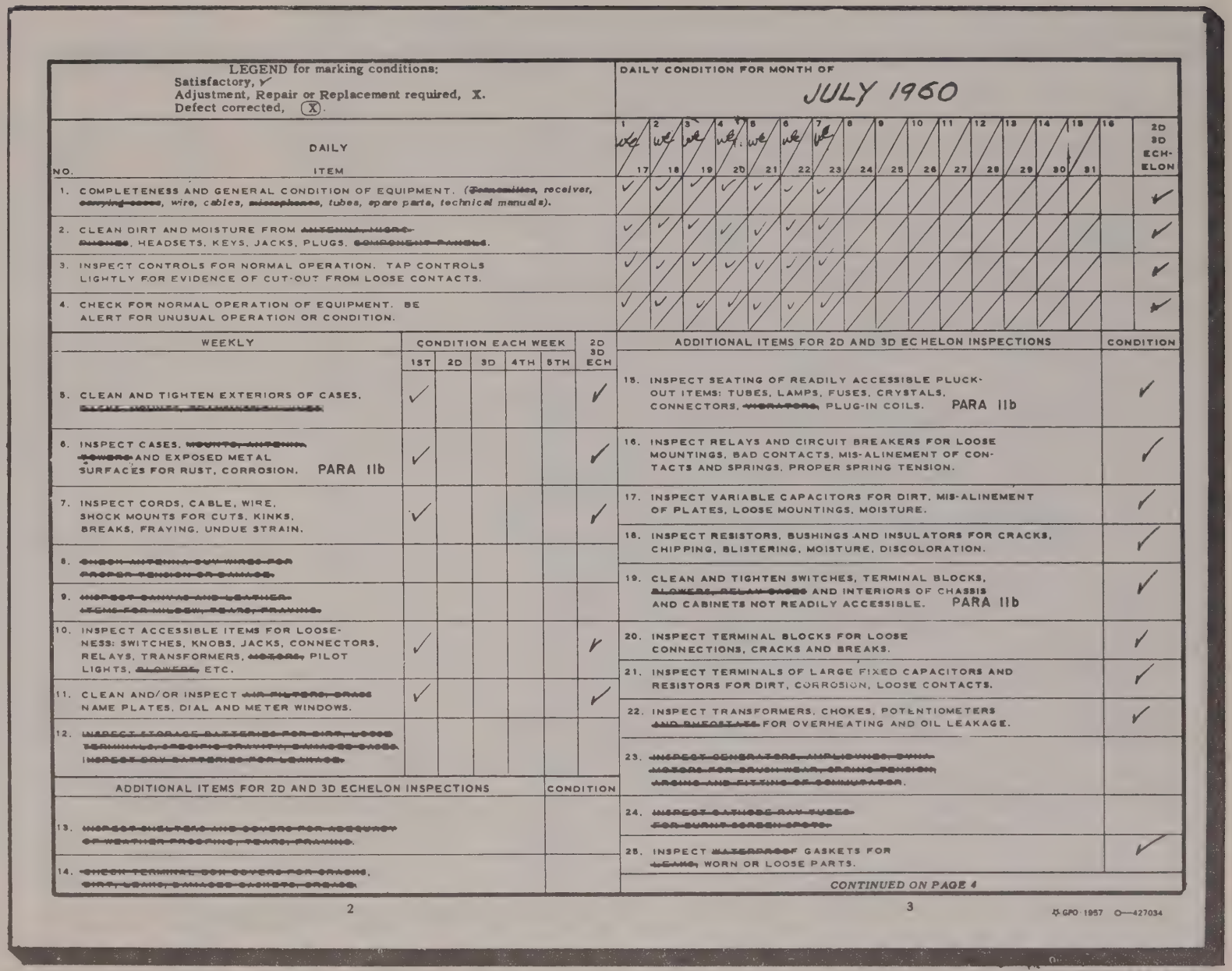
a. Phillips Screwdriver. The Phillips screwdriver is used to remove the screws that fasten the dust covers, the front panel, the removable subchassis, and the terminal boards.

b. Bristo (Fluted) Socket Wrench. The No. 8 fluted socket wrench is used for removing the front panel bar knobs and the MEGACYCLE CHANGE and KILOCYCLE CHANGE knobs.

11. Preventive Maintenance

a. DA Form 11–238. DA Form 11–238 (fig. 8) is a preventive maintenance checklist to be used by the second echelon repairman. Items not applicable to the equipment or to second echelon maintenance are ruled out in the figure. Check items 13 through 27 at least once per month. References in the ITEM block in the figure are to paragraphs that contain additional information pertinent to the particular item. Instructions for the use of the form appear on the form.

b. Items. The information in the chart below is supplementary to DA Form 11–238.



LEGEND for marking conditions:
Satisfactory, ✓
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF JULY 1960

NO.	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2D 3D ECHELON
1.	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. (~~Transmitter~~, receiver, ~~carrying cases~~, wire, cables, ~~microphones~~, tubes, spare parts, technical manuals).	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									✓
2.	CLEAN DIRT AND MOISTURE FROM ~~ANTENNA, MICRO-PHONE~~, HEADSETS, KEYS, JACKS, PLUGS. ~~SOUNDING PANELS~~.	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									✓
3.	INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS.	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									✓
4.	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION.	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									✓

	WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5.	CLEAN AND TIGHTEN EXTERIORS OF CASES, ~~CLOTH, HOUSES, TRANSMITTER HOUSE~~.	✓					✓
6.	INSPECT CASES, ~~MOUNTS, ANTENNA, BOWERS~~, AND EXPOSED METAL SURFACES FOR RUST, CORROSION. PARA 11b	✓					✓
7.	INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUE STRAIN.	✓					✓
8.	~~CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE~~.						
9.	~~INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, ROTS, FRAYING~~.						
10.	INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS, JACKS, CONNECTORS, RELAYS, TRANSFORMERS, ~~MOTORS~~, PILOT LIGHTS, ~~BLOWERS~~, ETC.	✓					✓
11.	CLEAN AND/OR INSPECT ~~AIR FILTERS~~, GRAIN NAME PLATES, DIAL AND METER WINDOWS.	✓					✓
12.	~~INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, CRACKED CASINGS, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE~~.						

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
13. ~~INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER PROOFING, TEARS, FRAYING~~.	
14. ~~CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LOOSE, DAMAGED GASKETS, BROKEN~~.	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. INSPECT SEATING OF READILY ACCESSIBLE PLUCK-OUT ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, ~~VIBRATORS~~, PLUG-IN COILS. PARA 11b	✓
16. INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, BAD CONTACTS, MIS-ALINEMENT OF CONTACTS AND SPRINGS, PROPER SPRING TENSION.	✓
17. INSPECT VARIABLE CAPACITORS FOR DIRT, MIS-ALINEMENT OF PLATES, LOOSE MOUNTINGS, MOISTURE.	✓
18. INSPECT RESISTORS, BUSHINGS AND INSULATORS FOR CRACKS, CHIPPING, BLISTERING, MOISTURE, DISCOLORATION.	✓
19. CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, ~~BLOWERS, RELAY CASES~~ AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE. PARA 11b	✓
20. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	✓
21. INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS.	✓
22. INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS ~~AND RHEOSTATS~~ FOR OVERHEATING AND OIL LEAKAGE.	✓
23. ~~INSPECT GENERATORS, AMPLIDYNES, DYNA-MOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR~~.	
24. ~~INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS~~.	
25. INSPECT ~~WATERPROOF~~ GASKETS FOR ~~LEAKS~~, WORN OR LOOSE PARTS.	✓

CONTINUED ON PAGE 4

GPO 1957 O—427034

Figure 8, DA Form 11-238, pages 2 and 3.

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
26. ~~INSPECT ANTENNA FOR CORROSION, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.~~	
27. CHECK FOR NORMAL OPERATION.	✓
28. ~~BEFORE SHIPPING OR STORING, REMOVE BATTERIES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

FOLD

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
SOUND EQUIPMENT, RADIO, DIRECTION FINDING
RADAR, CARRIER, RADIOSONDE AND TELEVISION
(AR 750-625)

EQUIPMENT NOMENCLATURE: RADIO RECEIVER R-390A/URR

EQUIPMENT SERIAL NUMBER: 4271

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/ Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

TYPE OF INSPECTION

OPER-ATOR	2/3 ECH-ELON	DATE	SIGNATURE
✓		1 July 1960	Cpl W. Eugene
	✓	3 July 1960	Roy Jones

4

DA FORM 1 MAY 57 11-238

REPLACES DA FORMS 11-238, 1 NOV 55; 11-239, 11-244, 11-245, 11-248, 11-249, 11-250, AND 11-251; WHICH ARE OBSOLETE.

Figure 9. DA Form 11-238, pages 1 and 4.

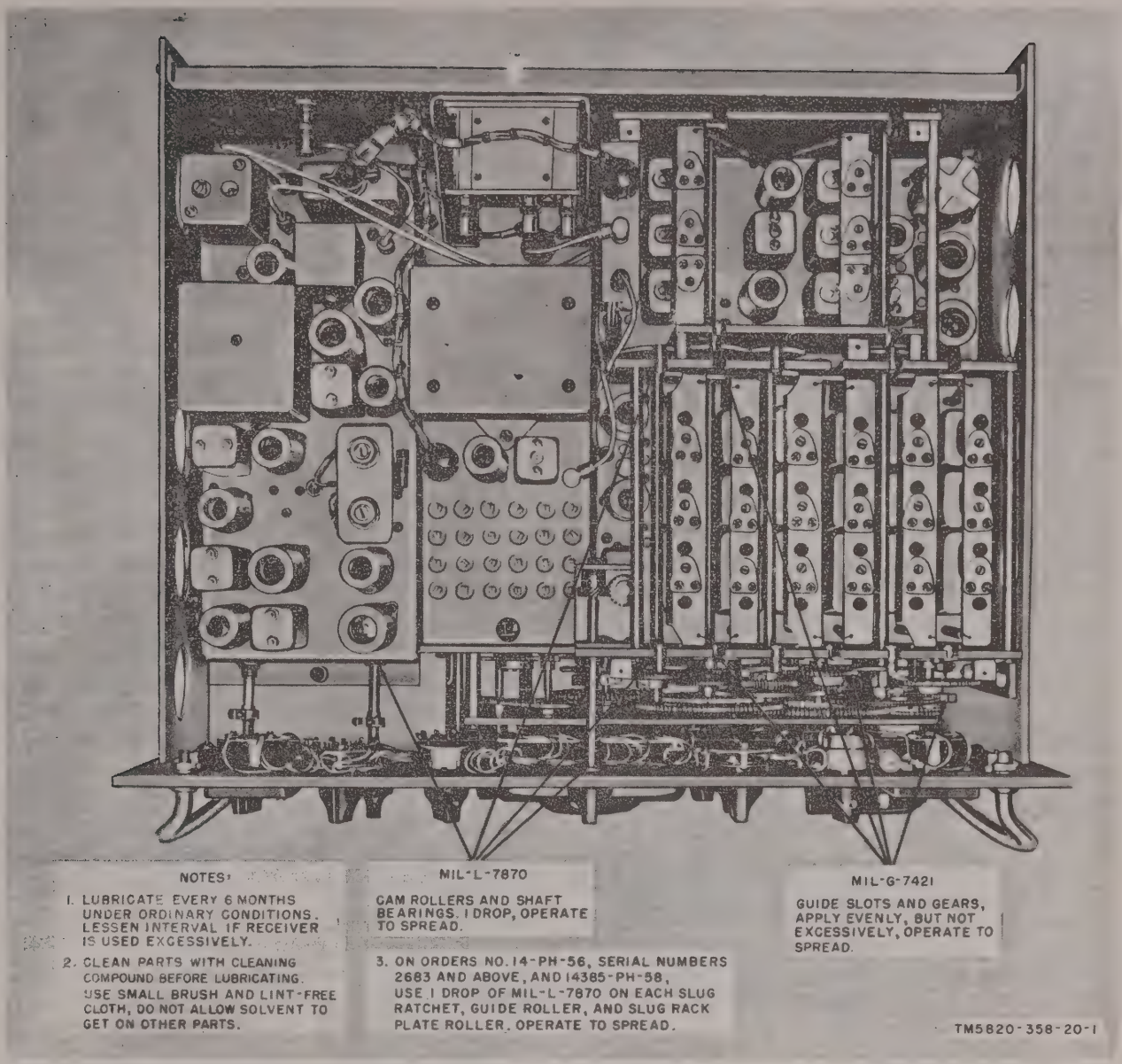

NOTES:
1. LUBRICATE EVERY 6 MONTHS UNDER ORDINARY CONDITIONS. LESSEN INTERVAL IF RECEIVER IS USED EXCESSIVELY.
2. CLEAN PARTS WITH CLEANING COMPOUND BEFORE LUBRICATING. USE SMALL BRUSH AND LINT-FREE CLOTH, DO NOT ALLOW SOLVENT TO GET ON OTHER PARTS.
MIL-L-7870
CAM ROLLERS AND SHAFT BEARINGS. 1 DROP, OPERATE TO SPREAD.
3. ON ORDERS NO. 14-PH-56, SERIAL NUMBERS 2683 AND ABOVE, AND 14385-PH-58, USE 1 DROP OF MIL-L-7870 ON EACH SLUG RATCHET, GUIDE ROLLER, AND SLUG RACK PLATE ROLLER. OPERATE TO SPREAD.
MIL-G-7421
GUIDE SLOTS AND GEARS, APPLY EVENLY, BUT NOT EXCESSIVELY, OPERATE TO SPREAD.
TM5820-358-20-1

Figure 10. Receiver lubrication points.

The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance procedures
15	Remove top and bottom dust covers where necessary. Inspect all tubes for proper seating, without removing them. Figures 2 and 3 show the locations of all tubes.
19	Use a clean, dry lint-free cloth for cleaning. Moisten the cloth with cleaning compound if necessary. After cleaning, wipe parts dry with a dry, lint-free cloth.

WARNING: Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.

12. Lubrication

a. General. The only parts of the receiver that require lubrication are the mechanical tuning system, which includes the radiofrequency (rf) gear train assembly and cam racks, and the BFO PITCH control shaft bearing. The receiver is lubricated at the factory

and should be lubricated every 6 months thereafter. If inspection indicates the need for more frequent lubrication, shorten the interval accordingly. Overlubrication may cause trouble and should be avoided.

b. Lubrication Inspection. Check the condition of the mechanical tuning system every time the receiver is withdrawn from its cabinet or case. Proceed as follows:

(1) Turn the MEGACYCLE CHANGE and the KILOCYCLE CHANGE controls throughout their ranges; observe the operation of all gears, cams, shafts, bearings, and guide slots.

(2) Look for grit, sand, and dust in the moving parts.

(3) Check the operation of the BFO PITCH control. If it does not operate freely, check the lubrication of the control shaft bearing.

CAUTION: Do not attempt to lubricate the sealed tuning unit of the variable frequency oscillator (vfo) subchassis; unstable operation may result.

c. Cleaning Prior to Lubrication. Prior to lubrication, thoroughly clean the interior of the receiver as follows:

(1) Where necessary, remove the top and bottom dust covers of the receiver.

(2) Use a suitable brush dipped in cleaning compound to remove any dirt, grit, sand, grease, and oil from the gears, cams, guide slots, shafts, and bearings.

(3) Rotate the MEGACYCLE CHANGE and the KILOCYCLE CHANGE controls so that all parts of the mechanical tuning system can be reached.

(4) Thoroughly dry all parts with a clean lint-free cloth before lubrication.

CAUTION: Remove excess cleaning compound from the brush so that none is dropped on wires and cables.

d. Detailed Lubrication Instructions. Lubricate the gears, cams, bearings, slug racks, and guide slots, where indicated in figure 10.

(1) Dip a short length of bare wire into lubricating oil, general purpose (OGP) and touch the end of the wire to the bearing. One or two drops of oil per bearing is sufficient.

(2) Put a small amount of Grease, Aircraft and Instruments (GL) on the gear teeth, the cam edges, and the guide slots.

(3) Turn the MEGACYCLE CHANGE and KILOCYCLE CHANGE controls during lubrication to spread the lubricant to all gear teeth and wearing surfaces.

Section II. TROUBLESHOOTING

13. Visual Inspection

a. To determine the cause of receiver failure, check the items in *b* below; then start a detailed examination.

b. Partial or complete failure of the receiver to operate properly may be caused by one or more of the following faults:

(1) Improperly connected, worn, or broken power cable.

(2) Improperly connected, worn, or broken loudspeaker cord or headset cord.

(3) Burned-out fuse. Be sure to use a fuse of proper value (para 4*g*).

(4) Grounded or broken antenna or antenna lead-in.

(5) Improperly connected antenna lead-in.

(6) Broken tube.

(7) Improperly connected or improperly seated external or internal interconnecting cables (fig. 3, 5 and 6).

(8) Loose connection on rear panel terminal stripes (fig. 7). Be sure to check the ground connection at the rear of the receiver.

14. Overall Operational Test

Before performing the equipment performance check, make the rapid checks given in *a* through *d* below. If the receiver does not

pass the tests, alignment or circuit repair is usually required at a higher maintenance level. Before turning in the receiver, refer to paragraph 16*f*(5) and (6).

Control	Position
RF GAIN	10
FUNCTION switch	CAL
BFO switch	ON
BFO PITCH control	+2
LINE GAIN control	10
LOCAL GAIN control	6
BANDWIDTH KC switch	4
AUDIO RESPONSE switch	WIDE
AGC switch	MED
LIMITER control	OFF
LINE METER switch	0

b. Disconnect the antenna. Tune the KILOCYCLE CHANGE control to any 100-kilocycle (kc) point for a maximum indication of the CARRIER LEVEL meter.

c. Starting at 02, turn the MEGACYCLE CHANGE control to each band. Adjust the ANT TRIM and KILOCYCLE CHANGE controls for maximum indication of the CARRIER LEVEL meter for each band. Listen to the signal produced by the calibration oscillator. The signal should be approximately at the same level for all bands. The minimum indication of the LINE LEVEL meter should be at the VU mark for all bands. This test will indicate which bands are not operating properly. Either alignment or circuit repair of these bands is usually required to return the bands to normal sensitivity. This work will be done at a higher maintenance level.

d. Turn the BFO switch to OFF and listen for a hum in the headset or loudspeaker. A slight hum is normal, but excessive hum indicates the need for repair at a higher maintenance level.

15. Equipment Performance Checklist

a. General. The equipment performance checklist (*e* below) will help the repairman to locate faults in the receiver. The list gives the items to be checked, the conditions under which the items are checked, the normal indications of correct operation, and the corrective measures to be taken. Follow the items in numerical sequence.

b. Action or Condition. For some items, the information given in the *Action or condition* column consists of the various switch and control settings with which the items are to be checked. For other items, it represents an action that must be taken to check the normal indication.

c. Normal Indications. The normal indications listed include the visible and audible signs that the repairman should observe when the items are checked.

d. Corrective Measures. The corrective measures listed are those that the second echelon repairman can make without turning the equipment in for higher echelon repairs. If the recommended corrective measures do not remove the fault, higher echelon repair is necessary.

e. Equipment Performance Checklist.

	Step No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Antenna ----------	Lead-in wire connected.		
	2	Loudspeaker or headset.	~~Loudspeaker connected to LOCAL AUDIO terminals 6 and 7, or~~ headset plugged into PHONES jack.		
	3	600-ohm line ---------	Connected to terminals 10 and 13. ~~If 600-ohm line is not available, connect headset to~~ J502 and J502		

	Step No.	Item	Action or condition	Normal indications	Corrective measures
			terminals for test purposes.		
PREPARATORY	4	Power cord	Connected to ac power source.		
	5	AUDIO RESPONSE switch.	Set at WIDE.		
	6	BANDWIDTH switch.	Set at 8 KC.		
	7	RF GAIN	Set at 10.		
	8	LOCAL GAIN control.	Set at 6.		
EQUIPMENT PERFORMANCE	9	FUNCTION switch	Turn to AGC	Dial lamps light	Check power cord, Check dial lamps and AC 3 AMP fuse. Refer to TM 11-5820-358-10.
				Rushing noise or signal heard in speaker or headset.	Test tubes. Check connectors between subchassis. Refer to paragraphs 14, 16, and 17.
	10	MEGACYCLE CHANGE control.	Set at each band in turn.	Normal signal output on each band.	Rotate control several times to clean switch contacts. Refer to paragraphs 14 and 16.
	11	KILOCYCLE CHANGE control.	Tune across any band	Signals received. CARRIER LEVEL meter indicates strength of received signals.	Refer to paragraphs 14, 16 and 17.
	12	ANT TRIM	Rotate control	Obtain peak indication on CARRIER LEVEL meter for each band.	Refer to paragraphs 14, 16, and 17.
	13	LOCAL GAIN control.	Rotate control in either direction.	Volume at loudspeaker or headset increases and decreases.	Refer to paragraphs 14, 16 and 17.
	14	LINE GAIN control	Rotate control	Output level to 600-ohm line or headset and LINE LEVEL meter increases and decreases.	If headset level varies and pointer of meter is sticking, tap meter lightly. If local output is satisfactory but line output is weak, check

	Step No.	Item	Action or condition	Normal indications	Corrective measures
					tubes V602 and V604. Refer to paragraph 17.
	15	RF GAIN control --	Rotate control --------	Audio output and CARRIER LEVEL meter indication increase and decrease.	Refer to paragraph 16.
E	16	FUNCTION switch -	Turn to MGC --------	With no signal input, noise level should increase slightly and CARRIER LEVEL not indicate.	Higher echelon repair required.
Q					
U					
I			Turn to AGC, and tune through several different signals.	Output volume nearly constant.	Check tubes V506, V508, and V509.
P					
M			Turn to CAL, and then operate KILOCYCLE CHANGE control.	Deflection on CARRIER LEVEL meter at each 100-kc reading.	Reset ANT TRIM control.
E					
N	17	LIMITER control --	Turn clockwise --------	Noise peaks are reduced in amplitude.	Check V507.
T					
	18	BREAK IN relay switch.	Turn to ON. Short BRK IN terminal 9 on rear panel to ground momentarily.	Break-in relay functions to silence receiver.	Higher echelon repair required.
P					
E	19	LINE METER switch.	Turn to 0. Adjust LINE GAIN control for LINE LEVEL meter indicator at VU mark.	LINE LEVEL meter indication at VU mark.	Higher echelon repair required.
R					
F					
			Turn to +10 ----------	Pointer indicates —10 --	Higher echelon repair required.
O					
R			Turn to —10 ----------	Pointer goes completely to right.	Higher echelon repair required.
M					
			Turn to OFF ---------	Pointer goes completely to left.	Higher echelon repair required.
A					
N	20	BFO control and BFO PITCH control.	Turn BFO control to ON. Tune in a cw signal and vary the BFO PITCH control.	Tone of signal varies --	Check V505.
C					
E					
	21	BANDWIDTH switch.	Turn from 16 KC to .1 KC.	Selectivity becomes sharper and noise decreases. Only low-frequency audio tones are heard in the counterclockwise positions.	Refer to paragraph 16.
	22	AUDIO RESPONSE switch.	Operate through both positions.	Permits amplification of nearly full af range in	Quality of voice signal improves.

	Step No.	Item	Action or condition	Normal indications	Corrective measures
				WIDE position, and 800 cps in SHARP position.	
EQUIP. PERF.	23	OVENS switch -----	Turn to ON ----------	Oscillator ovens become warm in a few minutes.	Higher echelon repair required.
	24	FUNCTION switch -	Turn to STAND BY --	Receiver is silent. Filament circuits and oscillator circuits are kept on for immediate reception.	
STOP	25	FUNCTION switch -	Turn to OFF ---------	Turns off all receiver circuits.	

16. Supplementary Equipment Performance Checklist Information

The following procedure is effective when isolating receiver faults to a specific subchassis. Perform the procedures given in *a* through *h* below. Replace any defective tubes; if this does not remedy the trouble, higher echelon repair is required.

a. Presetting Receiver.

(1) Turn the FUNCTION switch to AGC.
(2) Turn the BANDWIDTH switch to 16.
(3) Turn the RF GAIN control to 10.
(4) Turn the LOCAL GAIN control to 6.
(5) Tune in a local station, preferably at a low rf. If no station can be heard, listen to the noise produced by the receiver.
(6) Turn the LINE METER switch to 0.
(7) Adjust the LINE GAIN control for a midscale LINE LEVEL meter reading.

b. Series Filaments Test. If neither V505 nor V701 lights, check V505, V701, and current regulator RT510 (fig. 2 and 3).

c. Power-Supply Subchassis Test. If all tubes light but the CARRIER LEVEL meter does not deflect and no sound or hum is heard in the headset, check V801 and V802 (fig 3).

d. Af Subchassis Test (fig. 2 and 3). While listening to a station or to noise, ground the DIODE LOAD terminal on the rear panel (terminal 14).

(1) The signal or noise at the local output and the LINE LEVEL meter indication should be greatly reduced.
(2) If only the local output is reduced, check V602, V604, and the seating of connector P120.
(3) If only the remote output is reduced (LINE LEVEL meter pointer moves to the left) check V602, V603, and the seating of connector P119.
(4) If neither output is affected, check V507 and V601.

e. If. Subchassis Test (fig. 2 and 3). With the controls set as in *a* above, turn the BANDWIDTH switch from 16 to each lower position and listen to the sound (or noise).

(1) The output should decrease at each position, until it can hardly be heard at .1.
(2) If there is little or no change as the BANDWIDTH switch is turned, check V501 through V504, and V506 through V509.

f. Rf Subchassis Test (fig. 2 and 3). Set the controls as in *a* above. Start with the megacycle frequency indicator at 00 and turn

the MEGACYCLE CHANGE control through its range to the highest frequency and listen to the noise in the headset.

(1) Across the tuning range, some adjustment of the ANT TRIM control is necessary to produce maximum noise.

(2) The noise at each detent position should be almost constant.

(3) There should be a pronounced increase in noise as the control is seated in each detent.

(4) If the rf tuner does not pass this test, check V201 through V204, V207 and V701.

Note. When V701 is replaced, the subchassis must be realigned at higher echelon.

(5) If all the bands except 00 through 08 operate, change crystal Y201 (para 20 and 21).

(6) Each crystal in crystal oven HR401 fig. 2 and 12) operates a megacycle band or a combination or 1-megacycle bands. To determine which crystal is defective, proceed as follows:

(*a*) Turn the MEGACYCLE CHANGE control to each band to determine which bands are inoperative.

(*b*) Record the numbers of the defective bands.

(*c*) Match the combination of defective bands with the combinations listed in the chart below.

(*d*) Replace the defective crystal (para 22).

Megacycle band affected	Crystal in use
00, 17	Y401
01, 18	Y402
02, 08, 19, 30	Y403
03, 20	Y404
04, 09, 21	Y405
05, 22	Y406
06, 10, 23	Y407
07, 15, 24	Y408
11, 25	Y409
12, 27	Y410
13, 29	Y411
14, 31	Y412
16	Y413
26	Y414
28	Y415

g. Calibration Oscillator Test. To test the calibration oscillator, proceed as follows:

(1) Turn the FUNCTION switch to CAL.

(2) Turn the MEGACYCLE CHANGE control to band 00.

(3) Tune the KILOCYCLE CHANGE control through its entire range.

(4) Listen for a beat note at every 100-kc point as the KILOCYCLE CHANGE control is tuned.

(5) If the calibrator fails to operate, make the following tests in the order indicated:

(*a*) Check V205 and V206 (fig. 2).

(*b*) Replace Y203 (para 21).

(*c*) If the fault cannot be remedied by this procedure, higher echelon repair is required.

h. Antenna Circuit Test. Rotate the ANT TRIM control. The CARRIER LEVEL meter should peak at one particular point.

(1) Disconnect the antenna and ground the ANTENNA UNBALANCED connector. A click should be heard and the noise should drop sharply.

(2) Ground both contacts of the ANTENNA BALANCED connector. A click should be heard and the noise should drop sharply.

(3) If the receiver does not pass this test, check the connectors on the antenna relay box.

17. Tube-Testing Techniques

a. Inspect all interior cable connectors for proper seating before removing the tubes.

b. Isolate the trouble to a specific subchassis of the receiver (para 16).

c. Use Test Set Electron Tube TV–7/U or equivalent, and proceed as follows:

(1) Remove and test one tube at a time.

(2) Substitute new tubes for only those tubes that are defective.

(3) Immediately discard tubes that are shorted or contain heater-to-cathode leakage.

d. If a tube tester is not available, use the tube-substitution method.

(1) Substitute a new tube for an original one. If no change is apparent, in the operation of the receiver, replace the new tube with the original. Check

each original tube until the equipment becomes operative or until all suspected tubes have been tested, and the need for higher echelon repair is indicated.

(2) Some circuits such as oscillator circuits (V206, V207, V401, V505, and V701 (fig. 2 and 3)) may function with one tube and not another, even though both tubes are new.

(3) If a replacement tube soon becomes defective, higher echelon repair is required.

(4) If tube substitution does not correct the trouble, *be sure that the original tubes are in the original sockets before forwarding the defective receiver for higher echelon repair.*

(5) If another receiver of the same type is available, refer to the instructions in *g* below.

e. Discard tubes only in the cases given in (1) and (2) below. Do not discard them merely because they meet or are slightly above the lowest acceptable value listed in the tube tester chart. Do not discard tubes merely because they have been used for some time. Satisfactory operation in the receiver is the final proof of tube quality.

(1) Discard a tube when a tube tester or other instrument shows the tube to be defective.

(2) Discard a tube when the defect, such as a broken glass envelope or a broken connecting pin, can be plainly seen.

f. Be careful when withdrawing a miniature tube from its socket. Do not rock or turn it; pull it straight up. The variable-frequency oscillator tube shield is held in place by a special clamp. Be sure that the metal insert is in place, and then replace the shield. Straighten the pins with the proper pin straightener, if one is available, before replacing tubes in the receiver.

g. Tune a similar receiver, which is in good operating condition, to a voice signal that is not subject to fading, preferably to a signal on one of the lower frequency bands. Turn the FUNCTION switch to AGC and the RF GAIN control to 10. Make the substitutions from the faulty receiver to the corresponding position in the good receiver, one tube at a time; gently tap the tube under test; if noise or abnormal change in volume is observed, replace the tube. A considerable decrease in indication on the CARRIER LEVEL meter or a noticeable decrease in volume or quality of the signal emitted from the speaker or headset indicates a weak or otherwise defective tube; however, observe different test results for the following tubes.

(1) When automatic gain control (agc) tubes V508 and V509A are weak, a decreased indication on the CARRIER LEVEL meter with an increase in volume may be noted. A weak V509B (agc time constant circuit) will cause an increase in indication on the CARRIER LEVEL meter without any change in volume. A weak V509B intermediate frequency (if.) cathode follower will produce a weak signal at the IF OUTPUT connector (J116). After testing tube V507 (noise limiter) in the usual manner, tune the receiver away from the test signal and, if noise is received, rotate the LIMITER control clockwise; the tubes under test and the tubes known to be good should be equally effective in reducing noise. After testing these tubes, return the LIMITER control to OFF, and retune the receiver to the test signal. To test V505, turn the BFO switch to ON and, while turning the BFO PITCH control through its entire range, listen for the beat note.

(2) Test tubes V801 and V802 of the power supply subchassis and V701 of the vfo subchassis by listening to the audio output and observing the indication on the CARRIER LEVEL meter. Visually inspect V605; if it does not glow properly, it will cause abnormal voltage on the +150-volt regulated line. When testing tubes V205 and V206, turn the FUNCTION switch to CAL, tune through several 100-kc points, and observe the indi-

cation on the CARRIER LEVEL meter.

(3) Test the tubes in the af circuits by listening to the quality of the output signal of the af channels. When testing tubes V602A and V603 (local af amplifier), listen to the output of the local audio channel. When testing tubes V602B (line af amplifier) and V604, listen to the output signal from the balanced-line circuit and observe the indication on the LINE LEVEL meter. Tube V601 is common to both the local and the line af channels. Generally, small changes in LINE LEVEL meter indication may be expected because of certain differences among tubes.

18. Power-Supply Subchassis Removal and Replacement

a. General. Removal and replacement of the power-supply subchassis does not require the removal or replacement of other subchassis or parts in the receiver, except for plug P111.

b. Removal.

(1) Disconnect plug P111 (fig. 3).

(2) Loosen the six green-headed captive screws that fasten the subchassis to the main frame of the receiver.

(3) Withdraw the subchassis from the receiver. The subchassis is heavy; be careful not to drop it.

c. Replacement.

(1) Carefully lower the power-supply subchassis into the receiver.

(2) Engage the six green-headed screws that fasten the subchassis to the main frame of the receiver. Tighten each of the screws.

(3) Reconnect plug P111.

19. Af Subchassis Removal and Replacement

a. General. The af subchassis can be removed from the main frame without the removal of other subchassis or parts, with the exception of the cable connectors that connect directly to the af subchassis.

b. Removal.

(1) Disconnect plugs P119 and P120 (fig. 3).

(2) Loosen the four green-headed captive screws that fasten the af subchassis to the main frame.

(3) Lift the af subchassis from the main frame.

c. Replacement.

(1) Place the af subchassis on the main frame.

(2) Engage and tighten the four green-headed captive screws.

(3) Reconnect plugs P119 and P120.

20. Removal and Replacement of Crystal Oven HR202 During Maintenance (fig. 2 and 11)

Removal and replacement of crystal oven HR202 does not require removal of the rf subchassis from the main frame.

a. Removal.

(1) Remove the retaining springs and the clamp that hold the oven in its octal socket.

(2) Pull the oven straight up out of its socket.

b. Replacement.

(1) Insert the oven in its socket. Make sure that the key on its base lines up with the keyway in the octal socket.

(2) Replace the retaining springs and the clamp.

21. Disassembly and Assembly of Crystal Oven HR202 to Replace Crystals (fig. 11)

a. Disassembly.

(1) Loosen but do not remove the screws that secure the oven cover to the oven.

(2) Turn the cover to the left (counterclockwise) until it stops, and lift the cover straight up from the body of the oven.

(3) Lift the crystal shield out of the oven body.

(4) Unplug crystals Y201 and Y203 and remove them.

b. Reassembly.

(1) When inserting crystals Y201 and

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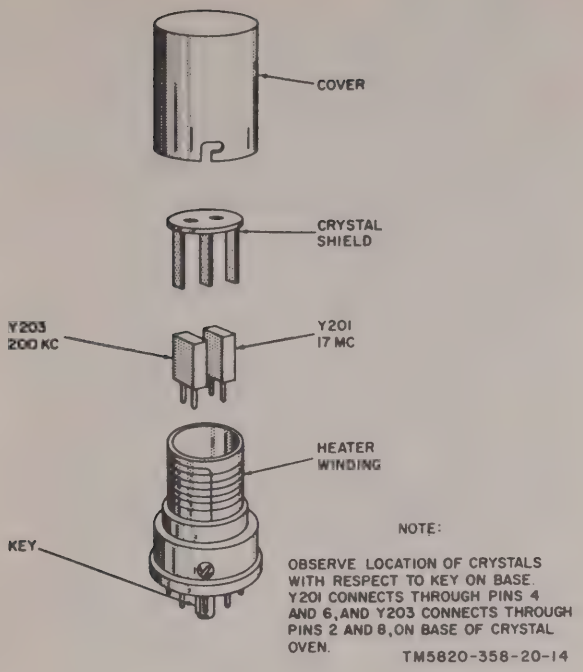
COVER
CRYSTAL SHIELD
Y203 200 KC
Y201 17 MC
HEATER WINDING
KEY
NOTE:
OBSERVE LOCATION OF CRYSTALS WITH RESPECT TO KEY ON BASE. Y201 CONNECTS THROUGH PINS 4 AND 6, AND Y203 CONNECTS THROUGH PINS 2 AND 8, ON BASE OF CRYSTAL OVEN.
TM5820-358-20-14

Figure 11. Location of crystal Y201 and Y202.

Y203, be sure to plug them in at the proper locations with respect to the key on the base (fig. 11).

(2) Gently push the crystal shield back into place.

(3) Line up the slots at the base of the cover with the screws on the base of the crystal oven.

(4) Push the cover down and turn it to the right (clockwise) until it stops.

(5) Tighten the securing screws on the base.

22. Removal and Replacement of Crystals Under HR401 Crystal Oven Cover (fig. 2 and 12)

a. Removal.

(1) Remove the Phillips screw and the lockwasher from the top of the subchassis and the two similar screws and lockwashers at the rear end of the subchassis.

Note. Do not loosen the four Phillips screws on top of the oven cover.

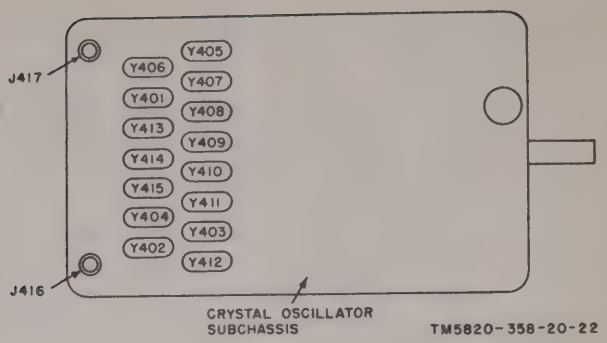

Figure 12. Location of crystals Y401 through Y415.

(2) Lift the cover straight up from the oven.

(3) The 15 plug-in crystals, Y401 through Y415, are now accessible for replacement (para 16*f*(6)).

(4) Pull the defective crystal straight up out of the crystal socket.

b. Replacement.

(1) Replace the defective crystal.

(2) Replace the oven cover. Be sure that the two plugs at the bottom rear of the oven cover line up with their jacks on the subchassis.

(3) Replace the three Phillips screws and the lockwashers.

23. Removal and Replacement of Incandescent Lamps (TM 11-5820-358-10)

a. Removal.

(1) Remove the four Phillips screws from the corners of the frequency-indicator window.

(2) Move the frequency-indicator window a few inches away from the front panel. Its connecting wires will hold it in position.

(3) Remove the defective incandescent lamps.

b. Replacement.

(1) Insert the new incandescent lamps.

(2) Place the frequency-indicator window in position; line up the four screw holes.

(3) Replace and tighten the four Phillips screws.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

24. Disassembly

The following instructions are recommended as a guide for preparing the receiver for transportation and storage.

a. Disconnect the antenna lead-in cable.

b. Remove all connections to the terminal strips on the rear panel of the receiver.

c. Unplug the headphone cord from the PHONES jack on the front panel.

d. Disconnect the power cable from the ac outlet and wind the cable around the clips provided for it on the rear panel of the receiver.

25. Repacking for Shipment or Limited Storage

The exact procedure for repacking depends on the material available and the conditions under which the receiver is to be shipped or stored. Follow the procedures outlined in *a* through *c* below whenever possible, as well as the information concerning the original packaging (para 3 and fig. 1).

a. Materials Requirement.

Material	Quantity
Waterproof-barrier material	22 sq ft
Fiberboard, corrugated, single-faced	40 sq ft
Tape, gummed, paper	10 ft
Tape, water-resistant, pressure-sensitive, 3-inch	16 ft
Steel strapping, 5/8-inch by 0.020-inch	13 ft
Wooden shipping box, 22¼ x 20½ x 14¾	1

b. Packaging.

(1) Inclose each technical manual in a close-fitting bag made of waterproof-barrier material. Seal the seams of the bag with water-resistant, pressure-sensitive tape.

(2) Cushion the receiver on all surfaces with pads made of single-faced corrugated fiberboard, in order to absorb shocks that might be caused by handling and shipping. Secure the cushioning with gummed paper tape.

c. Packing.

(1) Line the wooden box with waterproof-barrier material. Leave enough material so that it may be sealed over the receiver when it is placed in the box.

(2) Place the packaged receiver and the packaged manuals in the box.

(3) Seal the waterproof-barrier material with the water-resistant, pressure-sensitive tape.

(4) Nail the top on the wooden box.

(5) On the intertheater shipments only, apply two bands of steel strapping.

(6) Mark the shipping box according to the requirements of AR 220-10, section II.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

26. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 27 will be used to prevent further use of the equipment.

27. Methods of Destruction

Use any of the following methods to destroy the equipment. The time available will be the major factor for the methods used. The tactical situation also will determine in what manner the destruction order will be carried out.

a. Smash. Smash the tuning indicators, dials, meter, and controls; use sledges, axes, hammers, crowbars, or any other heavy tools available to smash the interior of the set.

b. Cut. Cut all cords and cables in a number of places; slash the interior wiring and cabling; use axes, machetes, and similar tools to cut the cabling, cording, and wiring.

c. Burn. Burn as much of the equipment as is flammable; use gasoline, oil, flamethrowers, or similar tools. Burn the technical manuals first. Pour gasoline on the cut cables and the internal wiring, and ignite it. Use a flamethrower to burn the spare parts, or pour gasoline on the spare parts and ignite them.

WARNING: Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

d. Explode. If explosives are necessary, use firearms, grenades, or TNT.

e. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

APPENDIX I

REFERENCES

Following is a list of references applicable and available to the unit repairman of Radio Receiver R–390A/URR.

AR 220-10	Preparation for Oversea Movement of Units (POM).
DA Pam 108–1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings.
DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
FM 21–5	Military Training.
FM 21–6	Techniques of Military Instruction.
FM 21–30	Military Symbols.
SR 320–5	Dictionary of United States Army Terms.
SR 320–50	Authorized Abbreviations and Brevity Codes.
TM 11–666	Antennas and Radio Propagation.
TM 11–2629	Antenna Kit for Double-Doublet Receiving Antenna.
TM 11–5820–358–10	Operator's Manual, Radio Receiver R–309A/URR.
TM 11–6625–203–12	Multimeter AN/URM–105.
TM 11–6625–274–12	Operator's and Organizational Maintenance Manual: Test Sets; Electron Tube TV–7/U, TV–7A/U, TV–7B/U, and TV–7D/U.

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically. Assemblies and subassemblies are in alphabetical sequence with their components listed alphabetically immediately below the assembly listing.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations.

(*a*) *Service.* To clean, to preserve, and to replenish fuel and lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment, such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(*f*) *Repair.* To restore to a serviceable condition by replacing unserviceable parts or by any other action required, using tools equipment, and skills available, to include welding, grinding, riveting, straightening, adjusting, etc.

(*g*) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(3) *1st, 2nd, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at the level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be used when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the section allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists the tool, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* A dagger (†) symbol indicates the echelons allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.
(4) *Remarks.* Entries in this column are used for explanatory notes.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communications zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

3. Mounting Hardware

The basic entries of the maintenance allocation chart do not include mounting hardware, such as screws, nuts, bolts, washers, brackets, clamps, etc.

Section II. MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
RECEIVER, RADIO R-390A/URR	service		X				11,12	
	adjust		X				7,11,12	
	inspect		X					
	test			X			4,5,6,8,9,10	
	align				X		1 thru 6,8,9, 10,12,13,14	
ADAPTER, CONNECTOR	replace		X					
AMPLIFIER, RADIO FREQUENCY	replace			X				
	repair			X				
AUDIO ASSEMBLY	replace		X					
	repair			X				
CABLE, RADIO FREQUENCY	replace			X				
CABLE, POWER ELECTRICAL	replace			X				
CAP, ELECTRICAL	replace		X					
CAPACITOR ASSEMBLY	replace			X				
CAPACITOR, FIXED	replace			X				
CAPACITOR, VARIABLE	replace			X				
CAPACITOR KIT	replace			X				
CLAMP, ELECTRICAL	replace			X				
CLIP, ELECTRICAL	replace		X					
COLLAR SHAFT	replace			X				
COIL, RADIO FREQUENCY	replace			X				
CONNECTOR, PLUG, ELECTRICAL	replace			X				
CONNECTOR, RECEPTACLE, ELECTRICAL	replace			X				
CONVERTER, FREQUENCY, ELECTRONIC	replace			X				
	repair			X				
CORE, ADJUSTABLE TUNING	replace			X				
COUNTER, ROTATING, FIXED MOUNTING	replace				X			
COUPLING, SHAFT, FLEXIBLE	replace				X			
COVER, ELECTRICAL CONNECTOR	replace			X				
CRYSTAL UNIT, QUARTZ	replace		X					
CRYSTAL UNIT, RECTIFYING	replace			X				
DETENT, SWITCH	replace			X				
ELECTRON TUBE	replace		X					
FILTER, BANDPASS	replace			X				
FILTER, RADIO INTERFERENCE	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
R-390A/URR (continued)								
FUSE, CARTRIDGE	replace	X						
FUSEHOLDER	replace			X				
GEAR, BEVEL	replace			X				
GEAR, BEVEL AND SPUR	replace			X				
GEAR, SPUR	replace			X				
GEAR TRAIN ASSEMBLY, RADIO FREQUENCY	replace			X				
GEAR ASSEMBLY	replace			X				
GUIDE, COUPLING	replace			X				
HOLDER, CRYSTAL UNIT	replace			X				
INSERT, ELECTRICAL, CONNECTOR	repair			X				
JACK, TELEPHONE	replace			X				
JACK TIP	replace		X					
KNOB	replace		X					
LAMP, GLOW	replace			X				
LAMP, INCANDESCENT	replace		X					
METER, AUDIO LEVEL	replace			X				
OSCILLATOR, RADIO FREQUENCY	replace			X				
	repair			X				
OSCILLATOR, VARIABLE FREQUENCY	replace			X				
	repair			X				
OVEN, CRYSTAL	replace			X				
OVEN, TUNED CIRCUIT	replace			X				
	repair			X				
PLATE-GEAR, SUB-ASSEMBLY	replace			X				
POST, BINDING	replace			X				
REACTOR	replace			X				
RECTIFIER, METALLIC	replace			X				
RELAY, ARMATURE	replace			X				
RESISTOR, FIXED	replace			X				
RESISTOR, CURRENT REGULATING	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH.	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
R-390A/URR (continued)								
RESISTOR, VARIABLE	replace			X				
RING, RETAINING	replace			X				
SCREWDRIVER, CROSS TIP	replace		X					OE item. Can be used by 2 nd echelon personnel
SHELL, ELECTRICAL CONNECTOR	replace		X					
SHIELD, ELECTRON TUBE	replace		X					
SOCKET, CRYSTAL	replace			X				
SOCKET, ELECTRON TUBE	replace			X				
SPRING, HELICAL EXTENSION	replace			X				
SHELL, ELECTRICAL CONNECTOR	replace			X				
STOP, DIAL	replace			X				
SUPPRESSOR, PARASITIC	replace			X				
SWITCH, ROTARY	replace			X				
SWITCH ASSEMBLY	replace			X				
SWITCH, THERMOSTAT	replace			X				
SWITCH SECTION, ROTARY	replace			X				
TERMINAL BOARD	replace			X				
TRANSFORMER	replace		X					
WASHER, STOP	replace			X				
WRENCH, SOCKET HEADSCREW	replace		X					

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH.	(3) 2ND ECH.	(4) 3RD ECH.	(5) 4TH ECH.	(6) 5TH ECH.	(7) TOOL CODE	(8) REMARKS
R-390A/URR (continued)							
ANALYZER, SPECTRUM TS-723/U				†	†	1	
AUDIO OSCILLATOR TS-382/U				†	†	2	
ELECTRON TUBE TESTER TV-2/U				†	†	3	
ELECTRON TUBE TESTER, TV-7/U		†	†	†	†	4	
FREQUENCY METER SET, I-129			†	†	†	5	
LOUDSPEAKER LS-3			†	†	†	6	
MULTIMETER, TS-297/U		†				7	Replaced by AN/URM-105
MULTIMETER, TS-352			†	†	†	8	Replaced by AN/URM-105
MULTIMETER, TS-505			†	†	†	9	
SIGNAL GENERATOR, AN/URM-25			†	†	†	10	
TOOL EQUIPMENT, TE-41		†				11	
TOOL EQUIPMENT, TE-113			†	†	†	12	
TOOL EQUIPMENT TE-114				†	†	13	
VOLTMETER, ME-6A/U				†	†	14	Replaced by ME-30A/U

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For explanation of abbreviations used, see AR 320-50.

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